

**SELECTIONS FROM THE RECORDS OF THE BOMBAY
GOVERNMENT.**

No. LIX.—NEW SERIES.

R E P O R T

ON THE

ZANZIBAR DOMINIONS,

BY

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HIS MAJESTY'S CONSUL AND BRITISH AGENT AT ZANZIBAR



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THE ZANZIBAR DOMINIONS.



THE territories of the Sultan of Zanzibar comprise all that part of the east coast of Africa included between

Boundaries. Magadosha, situated in about 2° north latitude, and Cape Delgado, situated in $10^{\circ} 42'$ south latitude; they are bounded on the north by independent tribes of Somal and Gallas, and on the south by the Portuguese territories under the Governor General of Mozambique. The extent of coast under the dominion of Zanzibar is about eleven hundred miles. The islands of Zanzibar, Pemba, and Monfeia are also included in the Zanzibar dominions. The territories on the mainland have no defined limit towards the interior, being chiefly inhabited by heathen tribes, who pay no taxes, and at a distance from the coast only acknowledge the authority of the Sultan when it suits their own interest to do so.

2. The coast of the mainland is called by the Arabs "El Sowahil," and the inhabitants, without distinction of tribes, "Sowahili," or dwellers on the coast, the name being derived from the Arabic noun "Sahil," a sea-coast. That part of the coast opposite to Zanzibar, and as far north as Mombassa, is called "Marima"—an African word signifying "the Coast." From Brava to Magadosha, the coast is called "El Benadir" or "the Ports," and to the south of Zanzibar, as far as Keelwa, it is called "Mungao."

3. The Island of Zanzibar, called "Ungujo" by the Africans, which forms the chief part of the Sultan's dominions, and the seat of Government, is situated at a distance of twenty to thirty miles from the African coast, along which it stretches in a north-easterly by a south-westerly direction; it is about forty-eight miles in length, and from fifteen to thirty in breadth. The northern point of the island, called

“Ugoowy,” is situated in $5^{\circ} 42'$ south latitude, and $39^{\circ} 15'$ east longitude. The south point of the island, called Ras Kizamkaz, is situated in $6^{\circ} 27'$ south latitude, and $39^{\circ} 27'$ east of Greenwich. Owen's charts of this part of the African coast are incorrect; it extends five miles further to the eastward than is laid down. The variation at Zanzibar in 1857 was $11^{\circ} 7'$ west.

4. The channel between the Island of Zanzibar and the mainland has sufficient depth of water for the largest ships; it is studded with many small islands, and shoals and sand-banks are numerous; but all dangers are avoided by keeping near the island; and there is everywhere good anchorage. There is no anchorage on the east side of the island, from which reefs extend to a considerable distance.

5. The Island of Zanzibar contains an area of about 400,000 acres; and the soil in most parts is of exceeding fertility. Being covered with woods and plantations, and the frequent rains causing perpetual verdure, it everywhere presents a delightful appearance. Towards the sea-coast, the island is low and the soil light and sandy; but at a distance of two to three miles from the sea, the land rises in gentle eminences to a height of three or four hundred feet. The slopes are covered with clove plantations and orange groves; rice, sugarcane, cassava or manioc, jowaree, &c. are grown in the plains and valleys, which are well watered with rivulets, which flow at all seasons, and afford a plentiful supply of good water to the town and shipping.

6. In the interior of the island the soil varies very much, in some parts consisting of a rich, black loam, formed by decayed vegetable matter, in others of a tenacious clay of a bright-red colour; this is the most productive soil, and is generally selected for clove plantations. From the sea the island presents the appearance of an unbroken forest of cocoanut, mango, and other trees, with the clove plantations on the hills forming the back ground; but the island is intersected by paths and green lanes in every direction, affording a never-ending variety of pleasant rides and walks. The country-houses of the Arab proprietors, and the huts of their slaves, are thickly dotted over the surface, surrounded with gardens and fields. The hedge-rows are

covered with flowering creepers, chiefly varieties of jasmine and wild pea. The hedges are formed of a species of laurel, wild orange, lime, and other evergreens; and pineapples of large size grow everywhere wild in profusion. In many parts are glades of undulating grass-land of park-like appearance, dotted with gigantic mango trees; and in the cold season mushrooms are abundant. The ponds are covered with rushes and white and blue lilies; and the air is perfumed with the blossoms of the mango and clove. The substratum is everywhere coral; not a stone is to be found in any part except of coral formation.

7. There are no streams of sufficient size to be called rivers; but numerous rivulets flow through the green valleys, and are, in many places, conducted through aqueducts to the gardens and country-houses of the Arabs. Two rivulets are led through aqueducts to the sea to the north of the harbour; the nearest, situated at Nitonay, about three miles from the shipping, has been neglected since the death of the late Imaum, and its water is now polluted by the slaves being permitted to wash clothes, vegetables, &c. in it. The other, situated at Boobooboo, about six miles north of the harbour, affords an abundant supply of good water at all seasons; at high tides, boats can go under the mouth of the aqueduct, where the water falls into the sea, and fill their casks without delay. Before the construction of these aqueducts, ships were in the habit of procuring water from impure sources near the town, and its use caused dysentery and other complaints, which were attributed to the climate, which thus acquired an evil reputation, which further experience has proved to be erroneous.

8. As no returns of any kind are kept relative to the population of the Zanzibar dominions, it is impossible to define the amount with any accuracy. The population of the Island of Zanzibar is estimated at about 250,000 souls. The town of Zanzibar contains about 60,000 inhabitants, and during the north-east monsoon there are probably from thirty to forty thousand strangers added to the permanent population. During the last few years, the population of the town has been rapidly increasing, and entire new quarters have been built. The population is

very mixed; the chief people are the Arab landed proprietors, who form a sort of aristocracy, possessing large plantations and numerous slaves. A numerous mixed race has sprung up, the offspring of Arabs by African women; many of these people are very intelligent and enterprising, and free from the bigotry and religious prejudices of the Arābs; but, they are in general dishonest and unprincipled. The number of the natives of the Comoro Isles settled at Zanzibar amounts to about four thousand. They are an active, intelligent race, of fairer skin, and more comely features than the Sōwahilis or other African races. They are brave and industrious, and make good domestic servants. There are also many natives of the west coast of Madagascar settled at Zanzibar. A considerable number of Arabs, from the coast of Hadramant, also come to labour as porters and carriers; they are a patient, industrious people; nearly all the work in the harbour—of shipping and landing cargo—is performed by them. The Arabs from the coast of Oman, called “Soorees,” are also numerous; they are a troublesome, turbulent, plundering race, always ready for any mischief; they are filthy, squalid, ill-featured savages, and arrant cowards. No sooner does the north-east monsoon commence to blow—about the middle of November—than thousands of these wretches hurry across in their boats from the Arabian coast, bringing for sale salted shark in a half-putrid state; piles of this are landed and stocked in open places in the centre of the town, tainting the air with the putrid odour. When the south-west monsoon sets in—about April,—these Arabs hasten to return north; and before leaving the African coast, kidnap men, women, and children, and convey them to the Persian Gulf for sale. If they meet a ship-of-war, they do not hesitate to throw their wretched victims overboard, in order to save their boats from capture.

9. The number of natives of India residing in the Zanzibar territories is between five and six thousand, and is annually increasing. Settlers from India. They consist chiefly of

Banians from Kutch and Jamnuggur, and of Khojas and Bhoras—Mahomedan sects from Kutch, Surat, and Bombay. Nearly all the shops in the Zanzibar bazars are kept by these people, and almost all the foreign trade of the port passes through their

hands. They are gradually acquiring all the wealth and property of the island; and the Arabs, from their indolence, and want of honesty and fair dealing, are becoming impoverished. Banians are established in considerable numbers at all the towns and villages on the opposite coast of the mainland, also at Mozambique, Eboo, and other Portuguese settlements. The Khojas and Bhoras have settlements on the west coast of Madagascar, and at the French colonies of Nossi Beh and Mayotta. The Banians never bring their families or females from India, and always look forward to a return to their own country after having acquired a competence; but the Khojas and Bhoras bring their wives and children, and become permanent settlers. They are a very thrifty, industrious people. A new quarter of the town, entirely inhabited by these Indian Mahomedans, has recently sprung up, and is rapidly increasing; each bugalow from Kutch usually brings a number of Khoja families as settlers. There is not a single Armenian or Jew residing at Zanzibar, and only about a dozen Persians. Several shops have recently been established by Portuguese from Goa; and there is one Parsee, who unites the professions of doctor, tin-worker, and gilder.

10. The language commonly spoken throughout the Zanzibar dominions is the "Kisnaheli," called by the
 Language. Africans "Maneno Ungoja." It is one of the great family of South African languages, and dialects of it are spoken over a vast extent of Eastern Africa—from the limit of the Galla and Somali country, in about 3° north latitude, as far south as the Zambesi. It is a soft, pleasing sounding language, without any guttural sounds, and so guided by rules of euphony, that most of the irregularities in its grammatical construction may be traced to the desire to avoid any harshness of sound. It has not the slightest affinity to the languages of the Abyssinians, Gallas, or Somal. It is not a written language, but the Arab settlers use the Arabic character in writing it. Arabs and Indians born on the coast or at Zanzibar seldom know their mother-tongue, and speak only "Kisnaheli." The Arabic spoken by the better class of Arabs at Zanzibar is a very
 Education. corrupt dialect. Education is at the lowest point; a few old Moollahs teach the boys to read and

write; and when they are able to read the Koran, and repeat their daily prayers, their education is considered complete. The blade-bone of an ox or a horse is used in the schools as a substitute for a slate. No foreign Missionary has yet attempted to establish a school at Zanzibar, although it would be gladly encouraged by the Sultan and the wealthy Indian merchants.

11. There are no regular civil courts of law established in the Zanzibar dominions, nor any written code of laws or regulations. In all civil matters, the Cazeec decides according to the institutes of the

Administration of
Justice.

Koran; there are no written proceedings, and no lawyers or advocates. After listening to both parties, the Cazeec decides the matter at once. But the Cazeecs are persons of no character, are not at all respected by the people, and bribery is said to be very common. I have myself detected the Cazeec in conniving at a most impudent case of forgery, and the exposure and denunciation of it appeared to excite no surprise. A certificate from the Cazeec is requisite for the legal manumission of slaves. The right of direct appeal to the Sultan exists in all cases, and his decision is final.

12. All criminal matters are decided at Zanzibar by the Sultan himself, for which purpose he sits in public durbar twice daily, attended by all his principal

Criminal Justice.

officers. Every complainant has free access, and the decision is given at once, without any written proceedings. Arabs have an inveterate dislike to writing; they keep no written record of the most important affairs. In a case of murder—the only crime for which the punishment of death is inflicted,—the criminal is taken out and put to death immediately his sentence is pronounced, unless he compound by paying the price of blood to the family of the murdered person. The “Diyat” or price of blood is eight hundred dollars; but it is optional with the family of the victim either to accept the diyat, or to insist upon the execution of the murderer. Conviction only follows on the direct testimony of several witnesses; no presumptive evidence is admitted; the criminal, on conviction, is taken direct to the market place and beheaded with a sword. In cases of serious assault, the culprit is confined in irons in the fort, or compounds by

paying a fine to the person assaulted. The punishment for trivial offences is a few blows on the back with a stick; a person who has been repeatedly convicted of robbery is punished with the mutilation of his right hand. Petty theft is punished with one or two dozen blows of a stick upon the back and chest. Fines are never levied for offences, unless as a compensation to the injured person. • Runaway slaves, when caught, are fastened by an iron

Treatment of Slaves. collar round the neck to a heavy chain, and

left exposed all day in a public thoroughfare; they remain chained up until claimed and released by their owners. Twenty to thirty slaves of both sexes, and of all ages, including even little girls, are frequently fastened by the neck with heavy iron collars to one chain—a cruel, disgusting sight, which shows the unfeeling nature of Arabs to the sufferings of slaves. Serious crimes are very rare, or probably the detection of crimes; only one execution has occurred at Zanzibar during the last three years; and a case of mutilating a thief very seldom occurs. A barbarous method, used for extorting a confession from a suspected person, is burying him up to the neck on the sea-beach and allowing the tide to gradually cover his head.

13. There is no regular police maintained in any part of the Zanzibar dominions; the Belooch and Mekrani soldiers of

Police.

the Sultan are employed in arresting criminals, and in the maintenance of order; they patrol the streets of Zanzibar by night, and guard the prisoners in the fort. They are, however, accused, and I believe justly, of committing most of the robberies which occur; and when employed to prevent the northern Arabs from stealing slaves and kidnapping children, they are known to be the most active agents in supplying these people with stolen slaves and children. They are all arrant cowards, and greatly fear the northern pirate tribes.

14. There are no regular jails; prisoners are confined in the forts of Zanzibar, Keelwa, Mombassa, and

Jails.

Lamoo. Imprisonment is never awarded for any specified period; and if the friends of a prisoner can afford to give a *douceur* of a few dollars to a Cazeer or any influential Arab, he is speedily released. Both sexes are confined together; the prisoners are allowed to have any food they can afford to purchase, or their

friends supply ; they can converse with all persons entering the forts, or play cards with the guard. Unless placed in irons for some serious offence, the imprisonment is of the mildest description. It is the custom to release all prisoners every year at the Eed Koorban, with the exception of those imprisoned for treason.

15. The Arabs of Zanzibar, although the ruling race, are generally very dirty, ignorant, and bigoted. The soft climate, added to the custom of keeping so many slaves and black concubines, has destroyed all the rough virtues usually attributed to Arabs, viz. manliness of character, energy, and personal courage. Foreign trade has of late years introduced amongst them a taste for foreign luxuries, such as handsome furniture and dress, costly mirrors, china, &c., and has thus caused an outward appearance of comparative civilization ; but with the love of finery and luxury, they have also imbibed a passion for spirituous liquors, and the consumption is rapidly increasing. They are inveterate liars, and so dishonest as traders that most of the foreign merchants avoid dealings with them, and in consequence all the trade of the port is passing into the hands of natives of India. A good deal of the landed property is also mortgaged to them. Were the prosperity of the Zanzibar dominions dependent upon these degenerate Arabs, it might well be despaired of.

16. The usual dress of the Arabs is a long, white cotton shirt, reaching nearly to the ancles ; a loongee or waist-cloth of silk or cotton of Muscat manufacture ; a turban of the same ; a short jacket of broadcloth called "Kisbao," richly embroidered when the wearer can afford it ; a cloth of richly embroidered silk and gold bound round the loins, and a light "Jubbah," or loose cloak of broadcloth, trimmed with gold and silver embroidery. All classes go armed with a straight, double-edged sword and a dagger.

The dagger or jumbea is worn everywhere, even by young boys ; it is the object upon which the Arabs display most extravagance ; those who can afford it, have the haft and sheath richly ornamented with gold and silver. The dagger worn by a wealthy Arab usually costs from 60 to 100 dollars. The shield which most Arabs carry is made

of rhinoceros' hide, and is slung over the left shoulder. A long, light spear completes the equipment. The Arab females never go abroad during the day, but at night visit each other with their slave girls. They never stir out without a veil, which is just large enough to cover the face, and is embroidered with a gold border, having two holes for the eyes. The women possess great influence, and are reputed to be much given to intrigue and love adventures. The Princes of the Sultan's family and the principal Arabs who attend the daily durbar, wear a long, loose coat of blue or red broadcloth, richly trimmed with gold embroidery. The Banians and Hindoos possess all the privileges of the Mahomedans, in the free exercise of their religion, burning their dead, and wearing turbans. They have one temple, and frequently meet together for feasts and religious ceremonies in gardens in the vicinity of the town.

17. The African slaves, who form the great bulk of the population of Zanzibar, are of various tribes from the interior. No slaves are brought from the coast of Africa to the north of Mombassa, the tribes being too fierce and warlike, and the Galla and Somali tribes are never made slaves. During the past year, 19,000 slaves were brought to Zanzibar from the coast of Africa. Of these, four thousand were from the "Marima," or coast opposite to Zanzibar, and fifteen thousand from the neighbourhood of the great lake of Nyassa, situated about forty days' journey south-west of Keelwa. The tribes which formerly furnished most of the slaves are now nearly exhausted, and this miserable traffic is being carried further into the interior every year, and is depopulating vast tracts of fertile country. Besides those brought to Zanzibar, a great number are taken south to the Portuguese ports in the Mozambique, where a very extensive slave trade is still carried on with the knowledge and connivance of the Portuguese authorities. The majority of the slaves belong to the great tribes of M'Nyassa, Miyan, and Magindo. The price of newly imported slaves at Zanzibar is from £2 to £7 for adult males or females, and 25 to 50 shillings for a boy or girl. A tax of one dollar per head has hitherto been levied on each slave landed, and this has recently been doubled by the Sultan. The tax is included in the farm of customs.

The auction market for slaves is held twice daily; the slaves of both sexes are examined and trotted out to show their paces, just like horses at a fair. The Negroes of the Miyan and Magindo tribes file their teeth to a point, and pierce the centre of the ear; the females frequently tattoo their bodies all over, and perforate the upper lip, leaving a large opening through which the teeth and gums are exposed, causing the lip to droop over the mouth; they also perforate the cartilage and side of the nose, and the lobe of the ear.

18. It is impossible to conceive a more revolting sight than the

Landing of Slaves. landing of a cargo of slaves on arrival from Keelwa. They are transported in open boats,

packed so closely that they are obliged to remain in one position; their naked bodies are exposed day and night to sun, wind, and rain; they have only just sufficient coarse grain given them to keep them from starvation; if the boats meet with contrary winds, they generally run short of water, and thirst is added to the other miseries these poor creatures endure; on arriving at Zanzibar, they are frequently in the last stage of lingering starvation, and unable to stand. Some drop dead in the custom-house and in the streets; others, who are not likely to recover, are left on board to die, in order that the owner may avoid paying the duty which is levied on those landed. After being brought on shore, the slaves are kept sometime in the dealers' houses until they gain strength and flesh, when they are taken to the slave market and sold to the highest bidder. The Arabs regard the slaves as cattle, and not the slightest regard is paid to their sufferings. They are too cheap and numerous to be cared for; this year slaves have been sold in the interior for half-a-dollar a-head, or ten slaves given in exchange for one cow or bullock. The slaves employed on the plantations lead an easy life: the Arab is too indolent and apathetic himself to make his slaves exert themselves. Two days in each week—Thursday and Friday—the slaves do what they please; all the produce they carry to market on these days is on their own account, and consequently these are the chief market days at Zanzibar, as the Negroes throng to market from all parts. Each slave in the country has a good-sized hut, with a garden round it; in this they often display a good deal of simple taste; and in their habits of cleanliness form a great contrast

to the dirty Arabs. The females are very fond of silver ornaments, necklaces, and armlets of coloured Venetian beads; and they pay great attention to their woolly hair, which they arrange in a great variety of fashions. Both sexes usually grow very stout after they have been some time on the island; but the mortality among them is very great; and very few of the women bear children—not more, probably, than five per cent. of them. When hired out to labour by their masters, slaves receive eight Indian pice, about $3\frac{1}{2}d.$ per day: of this, the master generally takes five pice, leaving the slave three pice to provide himself with food. Men, boys, and women receive the same amount of pay. Frequently a man who is a slave himself is the owner of several other slaves; and even a servant who is receiving four or five dollars a month wages, is frequently the owner of one or more slaves. An Arab who is the owner of three or four slaves frequently lets them out to labour, and will live on what they earn, scorning to apply himself to any industrious pursuit, and lounges about all day with dagger, sword, and shield, considering himself a man of property. Manumitting a slave is considered a very laudable act, and is often done by a master when at the point of death, as the last means of seeking Divine favour; the Cazee writes out the deed of freedom, and it is frequently worn by the liberated slave enclosed in a silver case on the arm or neck. Liberating a slave is even considered sufficient atonement for a false oath. I have never heard a Mahomedan attempt to defend slavery, as it now exists, by appealing to the Koran; on the contrary, in arguing on it, they all admit its wickedness and injustice, and that no blessing ever attends wealth acquired in the traffic. The merit attached to emancipating a slave is the best criterion of their real feelings on the subject. The slave dealers are a vile, base set of unfeeling wretches; their occupation is regarded as infamous; and they have not the slightest regard for their victims, treating them as brute animals. The traffic in slaves is now everywhere prohibited

Slave Trade.

on both coasts of Africa, except in the Zanzibar dominions; the only persons who benefit by it are a few vile, sensual Arabs; whilst it is carried on with revolting cruelty, and is desolating vast districts in Eastern Africa. I believe that its entire prohibition would add greatly to the prosperity of

Zanzibar, and be a great benefit to all classes. A great increase in the trade of Zanzibar, and in the growth of agricultural produce, has taken place since the abolition by treaty of the slave trade to the Persian Gulf and Red Sea in 1847; since which period the customs revenue has increased 38 per cent. When first landed, the slaves of both sexes are in a state of almost complete nudity; after being sold, they are generally decently clothed; the men wear a loin-cloth of American cotton, or a striped Muscat loongee, and a cap of white cotton or the red fez. The females wear a dress of coloured cotton or chintz; it is one piece wound tightly round the body under the arms, pressing the breast down; the shoulders and head are bare. Slaves and other Africans who can afford it, usually wear a long, white cotton shirt in addition to the loin-cloth.

19. Recent experience has proved that the climate of Zanzibar is not deserving the evil reputation it had acquired in former years. I believe its present comparative salubrity to be owing to the increase of cultivation and clearance of the jungle; to the growth of cloves having, in a great measure, superseded that of rice and sugarcane; and to a purer supply of water being obtained since the construction of the aqueducts. Greater attention is also paid to decency and cleanliness in the part of the town occupied by the foreign residents. The dead bodies of slaves and animals which were formerly left exposed to putrify on the beach are now removed and buried. Fevers of the remittent and intermittent form are very prevalent; small-pox generally appears every year about the month of October, and is very fatal amongst the African race; every trial of vaccination has proved a failure, probably from the vaccine matter having lost its power during the sea voyage. From the dense vegetation and humidity of the soil, sleeping even one night in the interior of the island generally has proved fatal to Europeans. During the month of October 1859, a detachment of sixty Europeans from Her Majesty's steam-frigate *Assaye* passed one night in the interior of the island: of these, twenty-six were attacked with fever a few days after, and three cases were fatal. A few years ago, Commodore Nourse, with a party from his ship, passed one night ashore in a country-house, and

every one of the party died of fever. The Sultan has several times engaged Europeans to superintend his steam sugar-mill on a plantation in the interior, but not one has survived after sleeping a few nights on the plantation. The fever is usually attended with incessant vomiting, followed by delirium. The town of Zanzibar being situated on a tongue of land, almost surrounded by the sea, is open to every breeze, and this is doubtless the chief cause of its salubrity. The crews of the merchant ships in the harbour are generally very healthy, although working in the sun all day at all seasons. Owing to the excessive humidity and small annual range of the thermometer, the climate is exceedingly enervating, and therefore not favourable for a prolonged residence; the members of the foreign mercantile houses usually leave for a change of climate after a residence of three years.

20. There are two rainy seasons at Zanzibar, the heaviest being in March, April, and May, during which months

Fall of Rain.

of 1859, 104·25 inches of rain fell; and the

lesser rainy season in September and October. The total fall of rain in 1859 amounted to 167 inches, being more than double the average annual fall at Bombay. January, February, and March are the hottest months; and July, August, and September the coolest. The extremes of the temperature during 1859 were 89 and 70 degrees Fahrenheit, making the extreme range during the year 19 degrees. The mean range during the year was only 7·9 degrees. The mean temperature was 79·9 degrees. The prevailing winds for nine months

Prevalent Winds.

in the year are from the south-west and east;

during the other three months, the wind blows strong from the north-east. The north-east monsoon, which prevails over the upper part of the Indian Ocean, reaches Zanzibar about December, and blows with great force for two months. At the change of the monsoon, about March, heavy squalls frequently blow from the south-west and west, accompanied with heavy rain; but the hurricanes, which cause such devastation further south, never extend to Zanzibar. The dews are very heavy nearly throughout the year. The rise of the tide is 13 feet.

21. The interior of the opposite mainland is reported to be a

temperate, healthy climate; but no white resident on the coast has

Climate of the Coast. ever yet escaped the fever; those who recover from the first attack appear to become acclimated. French and American merchants sometimes reside a considerable time at Brava and Lamoo, situated further north, without experiencing any ill effects. The hills near Mombassa are also healthy, with a temperate, bracing climate and picturesque scenery. A Mission of the London Missionary Society has been located in these hills during the last fifteen years; the natives are friendly to the missionaries; and during the last seven years an English lady has resided at the Mission.

25. Besides fevers and small-pox, elephantiasis is also very common amongst the Arabs and Africans, and appears to become hereditary. There is also a terrible disease—elephantiasis of the scrotum—which attacks old and worn-out people, or those who lead a very sedentary life. If a Banian, when attacked with this disease, leaves in time for his native country, it usually disappears. I have only heard of one European being attacked with it, and his constitution was worn out by a very long residence in the tropics. Cutaneous diseases are very common, doubtless owing to the filthy habits of the people, and from salted and half-putrid fish forming so great a portion of their daily food. Cholera is sometimes very fatal; in the spring of 1859 it carried off about twenty thousand persons in the Island of Zanzibar, and almost depopulated several towns on the opposite coast. It was introduced from the Red Sea at the commencement of the north-east monsoon, and travelled slowly down the coast; after it had nearly ceased at Zanzibar, it travelled south, and caused great mortality at Keelwa, Mozambique, &c. No return of births or deaths is kept; and there are no regular places of burial. The slaves are generally buried in a shallow grave dug in the sand on the sea-beach; Arabs and others are buried anywhere outside the town, in fields or gardens, or on the sides of the public roads. It is only during the last few years, owing to the remonstrances of the foreign residents, that the dead bodies of Negroes are committed to the earth. Arabs will dwell in the midst of the most offensive sights and odours without appearing to care for them.

23. With the exception of the medical officer attached to the British Consulate, there is no medical man in any part of the Zanzibar dominions; the Arabs

Medical aid.

are entirely ignorant of any medical treatment, always trusting to fate and charms. There is no regular dispensary attached to the British Consulate, but the medical officer gives medicines to all applicants who are suffering. He is freely applied to in cases of serious illness, and of wounds and accidents, and is thus enabled to alleviate a great amount of human suffering. He also affords medical aid to all the foreign merchants, and to the crews of vessels in the harbour.

24. The town of Zanzibar contains about sixty thousand inhabitants; like all Eastern towns, the streets are

Town of Zanzibar.

narrow, irregular, and ill-built. The bazars are extensive, and well supplied with articles of foreign manufacture. Nearly all the shopkeepers and artisans are natives of India. The palace of the Sultan and the houses of most of the principal Arabs and foreign residents are situated close to the sea, facing the harbour. The houses are generally flat-roofed, with an interior court-yard. Numerous large, substantial buildings are now being erected in place of the former ones of mud-walls and roofs of cocoanut leaves. The streets are never swept, and are always in a filthy state, there being no police or sanitary regulations. From a superstitious idea, the Arabs always leave a part of every house unfinished. The only public buildings are the mosques, which are low, mean buildings, without domes or minarets. After a house is once built, the owner, if an Arab, will never expend a farthing on repairs or painting, and thus most of the buildings have a dirty, ruinous appearance.

25. Provisions of all kinds are abundant; but prices have more than doubled within a few years, owing to the

Supplies.

increased demand. Bullocks and cows are brought from Pemba and the mainland; they do not live long in Zanzibar, particularly in the interior of the island; and it is equally fatal to horses, probably owing to the grass being too rank. The few horses on the island are imported from Muscat, chiefly by the Sultan for his own use. There are no horses on the opposite mainland. The Arabs usually ride Arabian donkeys, the price of which

is from 50 to 100 dollars each. Calves are never slaughtered. Sheep are scarce and very dear, except during the north-east monsoon, when the Somalis bring a great many from Berbera. A sheep or a goat costs about as much as a young slave. Fowls are abundant; geese and ducks very scarce. Turkeys are brought from Madagascar, but soon die. Fish of great variety are abundant; but few have any flavour. Vegetables are very scarce, being so little consumed by the natives. Pumpkins, sweet potatoes, coarse radishes, and yams from Pemba are generally procurable. All my attempts to grow European vegetables have been unsuccessful; even onions will not grow.

26. Most tropical fruits are very abundant; oranges of many varieties, citrons, limes and pummalows attain great perfection. The mango tree attains a size rarely seen in India, and yields two crops of fruit annually. During the hot season, mangoes are so plentiful that they form the chief food of the natives. The jack-fruit is largely consumed. The cashewnut, roseapple, papaya, banana, tamarind, guava, and custardapple are also common. Grapes, mulberries, figs, lichees, grow well, but are scarce. The cassava or mohogo, which forms the chief food of the slaves and poorer classes, yields four crops a year; when one crop is dug up, a piece of the stalk, about a foot in length, is stuck into the ground, and in about three months it produces another crop. The jowarree—*Holcus Sorghum*—grows to the height of eighteen feet. Cotton and sugarcane grow in great perfection; but the Arabs are too indolent to cultivate them for exportation. The sugar produced is chiefly consumed on the island. There is only one steam sugar-mill, which belongs to the Sultan. The rice grown on the islands of Zanzibar and Pemba is of a very superior quality; but since the general introduction of the clove, its cultivation has been so much neglected that, instead of exporting rice as formerly, it is now imported into Zanzibar to the value of £38,000 annually. It is chiefly brought from Malabar and the west coast of Madagascar. Coffee, nutmegs, pepper, and cinnamon also grow well; but no attention is paid to their cultivation. Wild indigo and sarsaparilla grow in the woods. The nutmeg trees, planted for ornament in the Sultan's gardens, grow in great perfection.

27. Leopards and wild hog are said to be numerous in the remote parts of the island; but in the neighbourhood of the town, and in the more populous parts,

Wild Animals.

there are no wild animals, with the exception of the civet cat and a species of mungoose. I have never seen a snake or any venomous reptile; and if any exist, they must be very scarce. There are no game birds, deer, or hares on the island, unless in the remote parts. A few antelope and hog-deer are found on the small islands in the harbour; but they have been brought from Muscat. Hippopotami are very numerous in all the creeks and rivers on the coast; and the forests are said to abound with lions, leopards, and other wild animals.

28. The harbour of Zanzibar is very commodious, and perfectly

Harbour of Zanzibar.

safe at all seasons, being protected on the west and north sides by four islands connected by coral reefs, which break the swell and cause the harbour to be always smooth. It is sheltered from the south winds by the tongue of land on which the town stands. Vessels anchor in from seven to nine fathoms water, a few yards from the shore, and can be hauled up on the sandy beach for repairs without danger. To the north-east of the town is an extensive creek, in which vessels of 300 to 400 tons can be careened in security. With a very little expense it might be converted into an excellent dock. The supply of water to the shipping is always abundant from the Boobooboo aqueduct, which is six miles north of the anchorage. There are no docks, wharfs, or piers. During the north-east monsoon, vessels bound to Zanzibar generally come round the north end of the island; and during the south-west monsoon, they enter the channel from the south. There is good anchorage in the channel, and also off Tombata—a small island near the north end of Zanzibar. The current outside generally sets to the north with great force, and a vessel once set to leeward, loses many days, and has generally to make a long stretch to the eastward before making the channel. During the north-east monsoon, when the dhows and bugalows from India, the Red Sea, Persian Gulf, and northern ports on the coast of Africa, visit Zanzibar, the harbour presents a very animated scene, being crowded with native craft; and a very extensive trade is carried on. Some of the dhows are from 200 to 400 tons

burden. Directly the southerly winds set in, they all hurry away to return north, many of them laden with slaves, either secretly purchased or kidnapped from the town or plantations. In this way, probably between three and four thousand Africans are carried north, and sold into slavery every year. There are no harbour or pilot dues; nor any charges upon shipping whatsoever beyond the import duty of 5 per cent.

29. The only military force kept up by the Sultan consists of about fourteen hundred irregulars, chiefly Beloochees, Military. Mckranecs, and Arabs from the coast of Hadramaut, with a few Turkish and Albanian gunners. These troops garrison Zanzibar, and the forts of Keelwa, Mombassa, Pemba, &c. They are armed with carbines and muskets; their pay is from three to five dollars a month; they are commanded by Jemadars, who receive from twenty to thirty dollars a month. They are utterly useless, except to control the Negro tribes on the coast, being arrant cowards, without any order or discipline; they wear no uniform, and their arms are seldom or ever cleaned. Recent events have shown that, on an expected invasion, the Sultan can soon collect from 20,000 to 30,000 armed men from the coast of Africa, in addition to those required for the defence of the towns and forts on the coast; but they have no proper leaders, and are contemptible as soldiers. The Sultan has a great number of guns of English construction, but neither ammunition nor carriages for them; recently two field pieces were equipped after considerable delay, but all the shot for them was expended in one day.

30. The naval force of the Sultan consists of the following vessels:—
Marine.

Shah Allum,	Frigate.....	52 guns.
Piedmontese	„	36 „
Victoria	„	32 „
Iskunder Shah,	Corvette.....	22 „
Artemise	„	22 „
City of Poona,	Brig	4 „
Africa	„	4 „
Taj	„	4 „

Some of these vessels are usually at anchor in Zanzibar harbour with their masts and yards struck; the others are kept ready for sea, and occasionally visit the Comoro Isles, Mozambique, Madagascar, &c. Men accustomed to the sea can be procured in considerable numbers at Zanzibar. The coasting vessels and dhows belonging to the various ports of the Zanzibar dominions are very numerous, and carry on an extensive trade with the Comoro Isles, the Portuguese ports in the Mozambique, the west coast of Madagascar, and the mainland of Africa. They also trade to Arabia, Cutch, Bombay, and the Malabar coast. Zanzibar is the nursery for most of the "Seedees," or African seamen found in nearly all the native craft navigating the Indian Ocean.

31. A duty of 5 per cent. is levied on all foreign articles imported into any of the ports of the Zanzibar dominions, with the exception of bullion. No articles are prohibited, and no monopoly of any article is allowed. No duty is levied on any article exported. The import duty of 5 per cent. is levied on all articles transhipped from one vessel into another in any port of the Zanzibar dominions, unless the cargo be only transhipped or landed during the repair of such vessel. The customs are farmed to an Indian Banian for the sum of 196,000 German crowns per annum; and as there are no taxes of any description levied by the Sultan, the customs form the whole amount of the public revenue, with the exception of an annual tax of ten thousand crowns paid by the "Mukhadim"—a race of

Customs and Public Revenues. people who inhabit the more distant parts of the islands of Zanzibar and Pemba, and who were the possessors of these islands prior to their conquest by the Arabs. They differ little in race and features from the tribes on the opposite mainland. They were called "Mukhadim" by the Arabs to denote their servile condition, the name being a corruption of the Arabic word "Khadim"—a slave or servant. The tax is levied in lieu of corvee or forced labour, and is payable by each head of a family. It was formerly reckoned at two dollars annually per family, but has been considerably reduced by the present Sultan. The Mukhadim are governed by their own chiefs, and have a Sultan, the descendant of the former rulers. He has now but little authority, and is

The Mukhadim.

responsible for the due payment of the capitation tax. He resides in a large castle in the centre of the island, and his tribe have a considerable town on the east coast of it. In time of war his influence is of great weight, as it entirely depends upon him whether the Mukhadim respond to the call to arms of their Arab ruler.

32. There is no tax or any other charge upon the land in any part of the Zanzibar dominions; it is the absolute freehold of the proprietor, who is, however, according to the feudal system of the Arabs, bound to assemble his followers, and aid the Sultan in time of war. A great portion of the land in Zanzibar is uncultivated; and, notwithstanding slave labour being so abundant, the value of landed property is very small, and is annually decreasing, owing to the fall in the value of cloves, and the Arabs being too indolent to pay attention to the produce of other articles. The soil being so rich, with such a favourable climate, would be a mine of wealth to a more industrious race. A large estate may be purchased for about five thousand dollars.

33. The sale of spirituous liquors, opium, &c. is permitted; no tax is exacted from the vendors, and the sale is not subject to any regulations or restrictions. Large quantities of vile French spirits are now imported, and all classes of the inhabitants are becoming addicted to drinking; even the Arabs of the more respectable class appear to have banished all restraint, and the females equally indulge in it. Very few persons of any class at Zanzibar smoke tobacco; it is strictly forbidden in the presence of the Sultan. The kaleon and nargili—so common in most Mahomedan countries—are very seldom seen at Zanzibar. The use of opium and other intoxicating stimulants is said to have much increased lately; in fact, since the death of the late Imaum, Syud Said, who was greatly feared and respected, the chief check upon the vicious propensities of the Arabs has been removed. Since the death of the late Imaum, numbers of sodomites have come from Muscat, and these degraded wretches openly walk about dressed in female attire, with veils on their faces.

34. The trade of Zanzibar is entirely the growth of the last few years, during which several French, American, and Hamburg mercantile houses have been established. The value of the aggregate trade of the port of Zanzibar during the year 1859 amounted to £1,664,577, viz. :—

Imports.....	£908,911
Exports.....	£755,666

£1,664,577

The Commander of Her Majesty's ship *Imogene*, which visited Zanzibar in 1834, states—"The port of Zanzibar has little or no trade; that to Bombay consists in the export of a little gum and ivory brought from the mainland, with a few cloves, the only produce of the island; and the import trade is chiefly dates, and cloth from Muscat to make turbans. These things are sent in small country vessels, which make only one voyage a year; the trade is consequently very trifling." The trade which has been created subsequent to the above period is certainly surprising, when it is considered that it has been developed under the primitive rule of an Arab chief; and it affords a proof of the great resources of Eastern Africa.

35. Zanzibar is now the chief market in the world for the supply of ivory, gum copal, and cloves. During 1859, the export of ivory amounted to 488,600 lbs., of the value of £146,666 18s.; that of gum copal to 875,875 lbs., value £37,166 18s.; and that of cloves to 4,860,100 lbs., value £55,666. The ivory is all brought from the interior of Africa, in exchange for American cottons, Venetian beads, and brass wire. The gum copal is dug from the earth a few miles inland on the coast of Africa; an inferior sort is also found on the Island of Zanzibar; the supply is supposed to be inexhaustible, and the production only limited by the indolence of the Negroes, who will only dig enough to supply their daily wants. The copal is found in plains destitute of trees. In the Island of Zanzibar it is chiefly found in barren, sandy spots, where nothing grows. The

natives, and also the Bānians who purchase the copal from the diggers, believe it to be a resinous deposit of the earth, as it is never found near trees. The cloves are entirely the produce of the islands of Zanzibar and Pemba. The first clove trees were introduced about thirty years ago from the Mauritius; being found to thrive, they were extensively planted, and have now become the most valuable productions of these islands. The average annual crop of cloves is

Exports. about 200,000 faraslahs, or 7,000,000 lbs.,
valued at about £85,000. Owing to the large

quantity grown, the price has fallen about 70 per cent. within a few years. During 1859, cowries to the amount of 8,016,000 lbs., value £51,444 9s., were exported to the west coast of Africa. The other chief articles of export are sesamum, red pepper, cocoanuts, rafters, coconut oil, and copra (dried coconut.)

36. The sesamum is all grown on the mainland near Lamoo, to the north of Zanzibar; its cultivation only
Sesamum. commenced a few years ago, as a demand for it arose for exportation to France; the quantity exported from Zanzibar in 1859 amounted to 8,338,360 lbs., value £20,800; besides which, a considerable quantity is exported direct from the coast.

37. The chief articles of import from foreign countries are American and English cottons, Indian dyed cloths, Muscat silk, and cotton loongees and turbans, Venetian beads, brass wire, muskets, gunpowder, rice, wheat, jowarree, and ghee. The amount of these articles imported during 1859 was as follows:—

		£.	s.	d.
American cotton	6,950 bales.	93,744	9	0
English cotton	150,300 pieces.	37,711	3	0
Indian	204,500 pieces.	53,777	18	0
Muscat loongees and turbans	200 bales.	11,888	18	0
Venetian beads	868 barrels.	21,879	17	0
Brass wire	2,000 barrels.	7,555	12	0
Muskets	22,780	18,840	5	0
Gunpowder	11,912 barrels.	8,874	15	0
Rice	18,640,000 lbs.	38,444	17	0
Wheat and jowarree	3,831,000 lbs.	7,022	5	0
Ghee	175,000 lbs.	7,778	2	0

The following table of Imports and Exports exhibits the trade of Zanzibar during 1859 :—

Countries.	Imports from			Exports to			Total.		
.	£	s.	d.	£	s.	d.	£	s.	d.
Great Britain				5,566	15	0	5,566	15	0
United States	126,398	16	0	118,688	18	0	245,087	14	0
France	114,790	18	0	55,000	0	0	169,790	18	0
Hamburg	101,296	18	0	36,777	15	0	137,074	13	0
British India	99,606	15	0	105,888	18	0	205,495	13	0
Cutch	57,872	0	0	69,664	10	0	127,536	10	0
Singapore	7,895	0	0	.....			7,895	0	0
Arabia	17,606	19	0	23,377	14	6	40,984	13	6
East coast of Africa	363,666	15	0	274,200	0	0	637,866	15	0
West coast of Africa ....	.....			51,111	2	6	51,111	2	6
Madagascar	19,777	14	0	16,411	2	0	36,188	16	0
Total. . £	908,911	15	0	755,686	15	0	1,664,598	10	0

38. The tonnage of the merchant shipping entered at Zanzibar during the past year amounted to 23,340 tons, being 3,619 tons less than in the previous year. Several circumstances have occurred to check the trade of this port during the past year—the visitation of cholera in the early part of it; a threatened invasion from Muscat; and the rebellion of one of the chief tribes of Arabs against the Sultan; and to these causes must be added the very extensive slave trade carried on by the French at the ports on the east coast south of Zanzibar, as so many of the country craft, which would otherwise have been engaged in conveying produce to Zanzibar, were more profitably employed in transporting the slaves from the coast to the French depôts at Nossi Beh and Mayotta. I heard of fourteen slave ships being at Nossi Beh at one time, waiting for cargoes. Until stopped by the French Government, this traffic in slaves threatened to entirely ruin all legitimate trade on the east coast of Africa.

39. The following table shows the arrivals of merchant shipping at Zanzibar during the last five years :—

Nationality of Vessels.	1855.		1856.		1857.		1858.		1859.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
British	2	409	2	1,167	3	770	4	1,166	1	493
Hamburg	15	3,689	20	5,438	22	5,488	23	6,230	17	4,428
United States	28	9,142	24	7,215	35	11,481	32	9,962	35	10,890
French	13	5,523	22	10,079	24	8,319	18	6,186	12	3,066
Arab	1	868	1	250	6	2,588	6	1,864	9	3,430
Portuguese .....	.	..	3	930	2	94	1	79	2	151
Prussian .....	.	..	1	600	.	..	1	600	.	..
Spanish	2	460	2	460	2	680	1	230	3	680
Danish .....	.	..	1	450	1	402	1	202	1	202
Hanoverian .....	.	..	.	..	1	419	2	440	.	..
Total .	61	20,091	76	26,589	96	30,241	89	26,959	80	23,340

40. The trade with Cutch, Bombay, and Arabia is almost entirely carried on in dhows and buttelas, of which no register is kept, nor is there any register of the number of country craft belonging to the port. The trade between the United States and Zanzibar is increasing ; whilst the arrivals of French shipping

Decrease of French trade at Zanzibar and Aden.

during the past year were 54 per cent. less than in 1858, 64 per cent. less than in 1857, and

70. per cent. less than in 1856. The return of

trade at Aden for 1858-59 shows a still more rapid decrease in the French trade at that port, the exports to France in that year having been 86 per cent. less than during the previous year. The market for French manufactured articles at Zanzibar is very trifling. Of the total imports from France during the past year, amounting to 516,451 dollars, 400,000 dollars consisted of bullion, and 41,000 dollars of Venetian beads. The exports to France consist chiefly of sesamum and copra (dried cocoanut), and cowries are exported in French vessels to the west coast of Africa. The trade between France and Zanzibar will probably altogether cease in a few years, as the American and Hamburg merchants are driving the French out of the market.

41. There is no direct trade between Great Britain and Zanzibar, but the chief part of the imports from India, Singapore, and Hamburg, consists of articles of British manufacture; and nearly the whole of the foreign trade passes through the hands of the natives of India. The ivory is consigned to them from the interior; the gum copal is purchased from the diggers by Banians residing on the coast; and the entire cargoes of American and Hamburg vessels are purchased by them. Besides natives of India, the foreign mercantile houses established at Zanzibar consist of three Hamburg, three United States, and two French. There are also Consuls of France, the United States, and Hamburg. The first time a trading vessel from the United States visited Zanzibar was in 1830; for some years only a few bales of cotton cloth could be disposed of—the Arabs were in a state of poverty, and had neither money nor goods to give in exchange. No vessel was able to procure a cargo anywhere on the east coast; almost the only trade carried on was the export of slaves to the Island of Bourbon and the Persian Gulf. As the amount of produce for exportation is limited, there is keen competition amongst the foreign merchants to procure cargoes, especially for the ivory and gum copal. The United States vessels, after landing cargo at Zanzibar, usually proceed to Aden or Muscat, and ship coffee or dates, returning to Zanzibar to fill up with ivory, copal, hides, &c.

42. The unit of weight is the “Wakjah,” which corresponds to the weight of one German crown. Most articles are sold retail in the shops and markets by the *mun*, which corresponds to the weight of forty-eight German crowns, and is $1\frac{6}{10}$ oz. less than 3 lbs. English. Ivory, cloves, gums, coffee, &c. are sold by the *faraslah*, which is equal to 35 lbs. English. Meat is sold by the *rattul*, which is a fraction less than 1 lb. English. Grain, cowries, salt, and articles in bulk are sold by the *jiglah*, which varies from 350 lbs. for sifted grain, cleaned cowries, salt, &c. to 460 lbs. for these articles when brought in bulk from the coast of Africa. The measures of length are the “Durrah,” or cubit equal to 18 inches, and the “War” equal to the English yard.

43. The only coins in circulation are the Maria Theresa dollar or German crown, and the copper pice coined at the Bombay mint. Maria Theresa dollars of the die of 1780 are still coined at the Vienna mint expressly to supply the demand for them in Eastern Africa. The number of copper picé obtainable for one dollar varies, according to the supply, from 130 to 110. There is generally a great scarcity of copper coin, as the British Indian pice is coming into circulation all long the east coast of Africa. Maria Theresa dollars form the circulating medium on the opposite mainland as far as Mozambique; but in the interior payments are made in cubits of American cloth, or in Venetian beads. These articles form the circulating medium all over Uniamesi or country of the moon, and the extensive dominions of the Casembé. American cottons are known everywhere by the name "Merikani." A considerable amount of Spanish and English gold coin is brought to Zanzibar from the ports in the Mozambique, where it is received in payment for slaves exported. The English sovereign passes for $4\frac{1}{2}$ to $4\frac{3}{4}$ German crowns. The rate of interest usually charged at Zanzibar is from 8 to 12 per cent. per annum; it is not legally recognised by the Arab authorities, being contrary to the law of the Koran, but is always charged in an indirect manner in transactions with Arabs.

44. There are several navigable rivers on the east coast of Africa within the Zanzibar dominions, but they have never been explored far by Europeans, and very little is known concerning them. The chief are the River Lindy, situated in about 10 degrees south; the Roovooma in about $10^{\circ} 25'$ south, and which is navigable for about fifty miles from the sea, and is said to be the largest river on the coast north of the Zambesi. The Masoonga, Lufiji, Shamba, Durnford River, and Juba, are broad, deep streams, but have never been explored.

45. The chief ports are Zanzibar, situated about the centre of the west side of the island of the same name; Port "Chak Chak," situated on the west side of the Island of Pemba, which has a good and secure anchorage, and is a

safe, commodious harbour. On the mainland, Port Keelwa, in about 10° south, where the chief slave trade on the coast is carried on; Keelwa Kivingia, a short distance north of the former, which is the destination of all the slave caravans coming from the great lake of Nyassa, and the country of Tyahow; also Manzoo Toongee, Kiswarra, Kaoli, Bhoweni, Buromaji, Panzani, Mombassa, Port Durnford, Lamoo, Brava, Murka, and Magadosha, all situated between $2^{\circ} 30'$ north and 10° south latitude. The best harbours on the coast are "Kiswarra," situated south of Keelwa, which is said to be the best on the coast, being safe and capacious, and having from six to ten fathoms water throughout; Keelwa Harbour, which is protected on the sea face by the island of the same name; Mombassa, of which Owen remarks—"There is, perhaps, not a more magnificent harbour in the world." It possesses good riding ground at the entrance, sheltered by an extensive reef on either side—an anchorage which, from its vicinity to the coast, constantly enjoys the sea breeze, and a steep, rocky shore, in many places rendering wharfs unnecessary, and in others forming a shelving, sandy strand, where vessels can be hauled up and careened, favoured by a tide rising twelve or fourteen feet. The Island of Mombassa is three miles long by two broad, capable, with very little labour, of being rendered almost impregnable. The surrounding country is fertile and healthy, there being no swamps nor stagnant pools.

46. Pemba, called by the Arabs "Al Khuthra," or the green island, is a long, low island of considerable extent, being about fifty miles in length. It is covered with woods and plantations, and has a considerable population, chiefly of the Mukhadim. On the western side are numerous creeks and inlets. It is exceedingly fertile, and produces a great deal of very fine rice, yams, cloves, &c. A great many cattle and goats are brought to Zanzibar from Pemba, and it carries on an extensive coasting trade. It abounds also in fine timber, which is used in building dhows and boats. It is situated about eighteen miles from the mainland and twenty-five from Zanzibar. No soundings can be obtained between Pemba and the mainland, nor between it and Zanzibar.

47. There are only two towns on the Island of Zanzibar, one of which is entirely inhabited by the Mukhadim, and is seldom visited by any other class. The chief towns on the coast are Keelwa, Mombassa, Brava, Lamoo, and Magadosha. They have all much declined from their former state of opulence. There are also many ruins of large towns which were destroyed by *those barbarous plunderers*—the Portuguese. The chief of these was Melinda, which was a wealthy, flourishing city, carrying on an extensive trade with India, Persia, and Arabia; but the *blighting, bigoted* rule of the Portuguese soon caused it to decline, and in less than a century after its conquest, Melinda had ceased to be a place of any importance.

48. The earliest settlement of Arabs on the east coast of Africa of which there is any authentic account, is that of the El-Harth tribe from the neighbourhood of Bahrein, who, about the year A.D. 924, founded the cities of Magadosha and Brava. About sixty years later, the city of Keelwa was founded by a colony of Persians from Shiraz, and from these settlements the Arabs and Persians gradually extended their authority over the whole of the east coast as far as Sofala, and also possessed themselves of the islands of Zanzibar, Pemba, and Monfea. For several centuries the Arab settlements formed a number of flourishing republics, governed by elders elected by the citizens; they carried on a great trade with India, Persia, and Arabia. When Vasco de Gama first visited this coast in 1498, he found that Mozambique, Keelwa, Mombassa, Melinda, Brava, and Magadosha were flourishing, well-built cities, the Arab inhabitants living in luxury, and the women clothed in rich silks and satins. Numerous merchants from Gujarat and Cutch also resided in these cities, carrying on an extensive trade in ivory, gold dust, gums, copper, &c., which they exchanged for the rich cloths and muslins of India.

49. Vasco de Gama arrived at Zanzibar in 1499, and was well received by the inhabitants, who were Mahomedans. They recognised the sovereignty of Portugal over the island in 1503, and agreed to pay an annual tribute. The conquest of the cities on the coast by the Portuguese

invaders, and the destruction of their commerce, soon followed, and both conquerors and conquered gradually lapsed into a state of barbarism, from which they have never recovered. Instead of encouraging commerce and communication with the interior, they have devoted all their energies to carrying on the slave trade, and have thus proved the greatest curse to East Africa. In the year 1698, the inhabitants of Mombassa, rendered desperate by the tyranny of their Portuguese rulers, sent a deputation to Saif bin Sultan, the Imaum of Oman, requesting his aid to free them from their oppressors; the Imaum, in consequence, sent a naval force which wrested Mombassa from the Portuguese. Keelwa and the other Portuguese settlements soon afterwards submitted to the Imaum, and the Portuguese were massacred or expelled from all their possessions north of Mozambique; but about the year 1728, the disturbances in Oman caused the Imaum to withdraw from the coast of Africa, and the Portuguese obtained possession again of their former territories, and re-established their authority along the whole coast from Patta to Keelwa.

50. A few years after, the Portuguese were again expelled, and the Imaum sent three ships from Oman, which took possession of Mombassa. The Island of Zanzibar first came under the authority of the Oman Arabs in 1784, when it submitted to an expedition sent from Muscat by the Imaum, Said bin Ahmed. Until the accession of the late Imaum Syed Said bin Sultan, in 1806, most of the territories which now comprise the dominions of Zanzibar were governed by their own chiefs, sometimes with a nominal subjection to the Imaum of Oman. In 1746, the inhabitants of the island and city of Mombassa elected Ali bin Osman as their Sultan, and threw off all allegiance to the Imaum. At the accession of Syud Said, Mombassa was governed by an independent chief by name Sheikh Ahmed. Patta, then a considerable city, was governed by the Sultan Foom Amadi. This chief died in 1807, when the succession was disputed by his son, Foom Aloti, and his son-in-law, Wazeer, whose father had been assassinated by Foom Amadi. It ended in the triumph of Wazeer, who was elected Sultan under the name of Sultan Ahmed. Wazeer having attained power through the assistance of the Chief of

Mombassa, it was agreed that Patta should, in future, be a dependency of Mombassa, and that an agent of the Mombassa Chief should reside there. The followers of Foom Aloti retired to Lamoo, which city refused to acknowledge the authority of the new Sultan of Patta, in consequence of which the Chief of Mombassa marched against Lamoo with a large force, but was defeated.

51. In order to guard against future attacks from Mombassa, the inhabitants of Lamoo claimed the protection of the Imaum Syud Said, and sent an envoy to Muscat. The Imaum consented to send a governor to Lamoo, and selected for this office one Kaleef bin Nassir, who, by order of the Imaum, erected a fort there.

History of the connection with Oman.

52. On the death of the Chief of Mombassa, in 1814, his son, Abdallah, refused to recognise the Suzeraineté of the Imaum; and instead of sending the customary annual present to Muscat, he sent a suit of armour, a little gunpowder, and a few bullets as a defiance. Shortly after the town and district of Brava submitted to the new Chief of Mombassa. In the meantime, the late Sultan of Patta had proceeded to Muscat to claim the assistance of the Imaum, and returned with a force which succeeded in obtaining his election as Sultan of Patta, under the sovereign authority of the Imaum Syud Said. In 1822, in consequence of the encroachments of the Sultan of Mombassa, the Imaum sent a naval force to compel the submission of the chiefs on the coast to his authority: and the Sultans of Patta, Brava, and other chiefs, by a formal act, agreed to acknowledge the sovereignty of the Imaum.

Suzeraineté of the Imaum of Oman.

53. About this time, Mahomed bin Nasir, who had been appointed by the Imaum governor of Zanzibar, took possession of the Island of Pemba; and the Sultan of Mombassa, Suleiman bin Ali, fearing that the Imaum intended to attack his territories, placed the island and fort of Mombassa under British protection, and the British flag was hoisted on the 3rd of December 1823, with the consent of the population. On the 7th of February 1824, Captain Owen arrived in the British frigate *Leven*, and concluded a convention, by which the port of Mombassa and

British protection over Mombassa.

its dependencies, including the Island of Pemba, and the coast comprised between Melinda and the River Pangani, were placed under the protectorate of Great Britain, under the following conditions, viz. :—

- Protectorate of Great Britain.** 1st.—That Great Britain should reinstate the Chief of Mombassa in his former possessions.
- 2nd.—That the sovereignty of the State should continue to be exercised by the Chief of the Mazareh tribe, and be hereditary in his family.
- 3rd.—That an Agent of the protecting Government should reside with the Chief.
- 4th.—That the Customs revenue should be equally divided between the two contracting parties.
- 5th.—That trade with the interior be permitted to British subjects.
- 6th.—That the slave trade be abolished at Mombassa.

54. The English protectorate over Mombassa not having been ratified by the British Government in January 1828, the Imaum, Syud Said, fitted out a considerable expedition and sailed for Mombassa, which surrendered to him ; and having taken possession of the fort and left a garrison, he proceeded with his fleet to Zanzibar, which he then visited for the first time. Since this period, the coast has remained in possession of the Imaum's family. The Mazareh chiefs of Mombassa were treacherously seized some years after their submission, and transported to Bunder Abbass on the coast of Persia, where most of them ended their days, after a lingering imprisonment. In 1843, the African tribes at Sewee near Brava, having rebelled against the Imaum, he despatched a force of 1,600 men and several ships-of-war to reduce them to submission ; but his troops met with a signal defeat ; all the guns were captured, and the commander of the expedition—a chief by name Ali-bin Nassir, who had been Envoy to England from the Imaum—was killed, together with his sons. A great many of the troops were killed, and the survivors only escaped by getting on board the vessels.

Sovereignty of the Imaum established.

Rebellion at Sewee.

Defeat of the Imaum's Troops.

The guns captured were afterwards restored by the Sewee tribes on payment of a sum of money. Since this period peace has been maintained with slight interruptions, and been attended with comparative prosperity.

55. Recent discoveries have shown that the interior of the opposite
 mainland is a fine, healthy country, producing abundantly cotton, coffee, gums, grains, and vegetables. Three vast lakes have recently been discovered, viz. the Nyassa, the Tanganika, and the Nyanza. Should the great lake of Nyassa prove to be connected with the northern branch of the Zambesi, it will be accessible to steamers; and not only may a considerable trade arise on it, but the main supply of slaves to the east coast can be intercepted. Most of the Negro tribes in the interior are quiet, industrious people. The Manganga tribes, near Lake Nyassa, grow a vast quantity of cotton; and Doctor Livingston states all classes are employed in spinning and weaving it. Unfortunately the slave trade has recently extended to these industrious tribes, and many of the Manganga are now amongst the slaves brought to Zanzibar from Kaelwa.

56. Were it not for the rapacity and extortions of the Portuguese authorities, there would soon be a valuable trade at the Mozambique ports. At present, goods are actually taken for hundreds of miles on men's heads through the African continent to the Portuguese settlements on the Zambesi, and sold cheaper than if imported by sea at Mozambique or Quillemane, and subjected to the charges of the Portuguese custom-house. Even at Mozambique—the seat of a Portuguese governor-general for the last three centuries—no Portuguese dare venture five miles into the interior, as, owing to the slave trade, the natives are so hostile: and thus the interior has to this day remained totally unknown to them. Rich copper mines are known to exist some distance in the interior; and the copper in pigs is sometimes brought to the coast and exported to Kutch. Specimens of malachite from these mines are also brought to Zanzibar. There are also copper mines near the coast in the neighbourhood of Mombassa. Iron stone is abundant, but is only worked by the natives to supply

their own wants. Arab traders from Zanzibar frequently remain travelling about the interior for several years, collecting ivory, gums, &c. * Recently an Arab has returned to Zanzibar after an absence of sixteen years in the interior, during which he crossed the continent to Loanda, on the west coast, and was met by Dr. Livingston near the Zambesi.

57. Should the Zanzibar dominions remain at peace, trade will probably continue to increase, and the towns on the east coast of Africa gradually recover the prosperous condition they had attained before the invasion of the Portuguese. The harbour of Zanzibar is the most commodious and safe on the east coast of Africa, and bids fair to become the chief emporium of foreign trade on this coast. The interior is gradually becoming better known through the enterprise of European travellers. An enterprising and scientific German traveller, Dr A. Roscher, has recently reached the lake of Nyassa, being the first white man who has ever done so. He says he never saw a finer country. A few days journey inland from Mombassa are vast mountains, which are said to be covered with perpetual snow. The trade of Zanzibar with the Comoro Isles and Madagascar is increasing, and a taste for the productions of Europe and America is spreading amongst all classes. The greatest drawback to the prosperity of these countries is the extensive slave trade, which is depopulating vast districts, and keeps the tribes in perpetual warfare with each other to supply the demand.

(Signed) C. P. RIGBY, Lieutenant Colonel,
Her Majesty's Consul and British Agent, Zanzibar.

British Consulate, Zanzibar, 1st July 1860.

BOMBAY:

Printed at the EDUCATION SOCIETY'S PRESS, BYCULLA.

**SELECTIONS FROM THE RECORDS OF THE BOMBAY
GOVERNMENT.**

No. LX.—NEW SERIES.

CAPTAIN FIFE'S REPORT

ON

THE EASTERN NARRA.


WITH TWO MAPS.


Bombay:
PRINTED FOR GOVERNMENT
AT THE
EDUCATION SOCIETY'S PRESS, BYCULLA.

1861.

No. 11 of 1860-61.

PUBLIC WORKS DEPARTMENT,

Dated 7th May 1860.

From the COMMISSIONER in Sind,

To the Right Honorable Lord ELPHINSTONE, G.C.B., and G.C.H.,
Governor and President in Council, Bombay.

(Agricultural—Irrigation.)

MY LORD,—I have the honour to submit, for the information of your Lordship in Council, Captain Fife's report (No. 455), dated 20th ultimo, in which he reviews the objects and expectations with which the works for restoring a supply of water to the Eastern Narra were undertaken, together with a critical analysis of the same by Colonel Turner, contained in his letter No. 981, dated 27th ultimo. A perusal of these reports will assure your Lordship in Council of the correctness of the anticipations indulged in when the works were first contemplated, and of the large returns that may be expected, on the completion of the Mitrow Canal, of which the prosecution has been lately ordered.

2. I agree with Colonel Turner in opinion, that, until the result of the Mitrow Canal is seen, the additional embankments for the Narra lands, and the proposed branch canals with heads at Jamrow and Tuquer-ke-Gote, be not undertaken. Plans and estimates for these works have not yet been submitted.

3. The sum of 8,191 Rupees, for the expenditure of which Colonel Turner recommends that sanction be accorded, is required for the

1. Wudkha Bhit,
2. Saleydee.
3. Hamid-ke-Bhit.
4. Shadad-ke-Thoree.
5. Bharee Bhit, and Chotiaree Khan-ke-Tauda, and Jatree.
6. Nulta.
7. Jatree and Sirrenwarce.

construction of seven embankments, which are noted in the margin.* The first four are trifling works, the necessity for which is due to alterations in the loose sandy banks of the Narra north of Mitrow, produced by the encroachment of the stream or by the action of the wind. The last three works are em-

bankments in connection with existing bunds between Bukkur and Sirrenwaree, calculated to control the volume of water in the Narra. The Chief Engineer has been requested to state whether funds are available for these works from the allotment for 1859-60. In the event of none being available, an application will be made to your Lordship in Council for sanction for this estimated expenditure from the allotment for the current season 1860-61.

I have the honour to be,

My Lord,

Your Lordship's most obedient humble Servant,

J. D. INVERARITY,

Commissioner in Sind.

Commissioner's Office, Kurrachee, 7th May 1860.

No. 981 of 1860.

PUBLIC WORKS DEPARTMENT,

Dated 27th April 1860.

FROM the CHIEF ENGINEER in Sind,

TO the COMMISSIONER in Sind, Kurrachee.

(Agricultural—Irrigational Canals).

SIR,—I have the honour to transmit a letter, No. 455 of 1860, from the Superintendent of Canals, reviewing the objects and expectations with which the works for restoring a supply of water to the Eastern Narra were undertaken; explaining the present state of those works and the effects they have produced; and showing how far the experience which has been gained justifies the expectations held out when the works were commenced.

2. After having surveyed the upper portion of the Narra in the year 1852, Captain Fife submitted three projects for a new supply

channel; the one selected was estimated to cost Rs. 4,77,805, and a return was promised of Rs. 52,000, or about 11 per cent.

3. The supply channel was not the only work then contemplated; for, at the same time, even Captain Fife represented that certain bunds not entailing "any great expenditure" would be necessary to economise the expenditure of water. I do not, however, think that, at that time, Captain Fife himself anticipated the heavy outlay that has been incurred.

4. In paragraph 9 of the letter now transmitted, Captain Fife states that the expenditure upon the supply channel has already amounted to	Rs. 7,98,595
and in paragraph 3 that the bunds have cost	1,41,308
	<u>In all.. Rs. 9,39,903</u>

5. The above expenditure does not apparently include the cost of protecting the supply channel now in progress, nor the works referred to in paragraph 12 of the letter, and probably the whole cost of the works for supplying the Narra valley will amount to about ten lacs of rupees, exclusive of the Mitrow Canal, estimated to cost Rs. 4,23,155.

6. The revenues of the Narra for the nine years from 1852-53 to 1860-61, Captain Fife states to have been Rs. 4,67,809. During the previous nine years there had been no flood, and the revenue of the whole valley had, during those years, averaged Rs. 1,405 only; but in 1851 a flood came down for the first time for twenty years, and, with the exception of one year, floods continued annually for the next six years. The flood of 1851 yielded a revenue of Rs. 8,405, that of 1852, Rs. 20,928, and these results were wholly irrespective of Captain Fife's works; for the supply channel afforded no water till 1858, and none of the bunds were finished until the beginning of 1854; no effects could therefore have been produced by them on the revenue until the year 1854-55.

7. If we assume that the floods of 1851 and 1852 produced average crops, such as might be constantly reckoned upon from a natural flood unaided by Captain Fife's works, we may estimate the actual return those works are likely to produce.

8. Omitting the two first years of Captain Fife's series, the average revenue of which was Rs. $\frac{8,405+20,928}{2}=14,666$, the amount realised during the remaining seven years was Rs. 4,38,576

During those seven years there were four floods;

therefore, deducting Rs. $14,666 \times 4 = \dots\dots\dots$ Rs. 58,664

the remainder due to the Narra works is $\dots\dots\dots$ Rs. 3,79,912

or per annum $\dots\dots\dots$ Rs. 54,273

9. The amount promised by Captain Fife was Rs. 52,500, or Rs. 1,773 less than the amount realised; but the estimated cost of the works was about half the actual outlay, so that the percentage which the receipts have borne to outlay has been rather less than $5\frac{1}{2}$ instead of 11.

10. It may be argued that, as the supply channel was not opened till 1858, its expense ought not to be considered as affecting the return during the previous years; but my object is to estimate the probable return for future years, and for that purpose I have assumed that natural overflow has effected that which will be ensured hereafter by the supply channel; and I fear that if I have erred, it has been on the wrong side; for the revenue of last year, when the supply channel was open and there was no flood, will, it is estimated, be less than Rs. 40,000, or 4 per cent. It is unsatisfactory that the flood only reached the village of Trimmoo, which is 13 miles short of where the natural flood of 1857 reached, and 34 miles short of the limit of the flood of 1856; still, I think, Captain Fife shows that last year must be considered an exceptional one, and I anticipate that Rs. 52,500 may be considered the minimum that may easily be realised.

11. It must also be remembered that the Mitrow Canal will be wholly dependent for its water upon the supply channel, and that therefore, if it realises the large profit promised, a portion of that profit will be fairly due to the outlay on the supply channel.

12. Under the explanation afforded in the 12th paragraph of Captain Fife's letter, I recommend that the amount of Lieutenant

LeMesurier's estimates (Rs. 8,191), transmitted to you with my letter No. 535, of 7th ultimo, be sanctioned; but until we have had more experience of the value of the Narra works, and see the result of the Mitrow Canal, the works suggested in the 24th to 27th and 30th and 31st paragraphs of Captain Fife's letter should, in my opinion, be postponed.

I have the honour to be,

Sir,

Your most obedient Servant,

H. B. TURNER, Colonel,

Chief Engineer in Sind.

Chief Engineer's Office, Camp Kurrachee, 27th April 1860.

No. 455 of 1860.

PUBLIC WORKS DEPARTMENT,

Dated 20th April 1860.

From the SUPERINTENDENT of CANALS in Sind,

To the CHIEF ENGINEER in Sind.

SIR,—As some years have elapsed since the improvement of the Eastern Narra was discussed and reported upon at length, and we have now had an opportunity of judging of its value in a remunerative point of view, and have gained experience in observing the actual working of the scheme, I think the period has arrived for again considering the whole subject, and forming plans for future management and improvement, and with this view I have drawn up the following report.

2.. When the subject of the Eastern Narra's improvement was first fairly entered upon in 1851, we had a great difficulty to encounter in the want of a sound knowledge of the revenue of Sind, and in the case of the Narra valley itself, the only information we possessed consisted of vague reports of a revenue obtained from the

Narra during a few seasons, the latest of which was in 1827, or sixteen years previous to the conquest, and twenty-four previous to the date of our enquiry.

3. After much careful consideration however, it was decided upon to form a large supply channel from the Indus at Roree, to throw an abundant supply of water into the Narra during the inundation period, and fertilize the lands for a rubbee crop, which was to be principally raised by people from the vicinity of the Indus, after they had reaped their khurreef crop each season. In addition to the supply channel, it was seen that numerous bunds would also be requisite to prevent the escape of the water into the deep depressions which existed among the sand hills of the eastern desert.

4. It however very fortunately occurred the same year that our attention was given to the subject, that the natural floods of the Narra which had produced the revenue of former times recommenced, and during the eight years which elapsed before the supply channel was brought into operation, the valley of the Narra was six times more or less fertilized by a natural supply alone. It was then found that nearly the whole revenue was obtained from the spread of the water over the country, and our bunds and embankments, to prevent the escape of the water into the desert, and increase its spread, were

* Bunds and embankments ..	Rs.	1,11,793	8	10
Repairs to do..		22,133	0	2
Maintenance and watching....		7,382	2	8

Total..	Rs.	1,41,308	11	8
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† 1852-53 ..	Rs.	8,405	3	4
1853-54 ..		20,928	12	1
1854-55 ..		55,909	0	5
1855-56 ..		81,448	7	5
1856-57 ..		6,130	0	0
1857-58 ..		1,70,057	0	0
1858-59 ..		81,225	7	6
1859-60 ..		8,705	7	5
1860-61 (probable)		35,000	0	0

Total..	Rs.	4,67,809	6	2
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pushed on with all possible expedition, and completed with excellent and immediate effect, notwithstanding several accidents which occurred to them. Our whole expenditure on these works up to 1st November last, including original cost, repairs, and maintenance of establishment, was Rs. 1,41,308-11-8, the details of which are given in the margin.* The total revenue realised during the same period, and what remains to be realised from the past inundation, amounts to Rs. 4,67,809-6-2, and is

shown in the margin† separate for each year.

5. That some of this revenue would have been obtained had our bunds and embankments not been constructed there is no doubt, but how small that would have been will readily be understood when I mention that the first flood which visited the Narra in 1851 only produced Rs. 8,405-3-4, though it was so large as not only to fill the channel of the Narra in the upper part of its course east of Rorce, but even to flood the whole valley across for a distance of eight miles, as explained in my report No. 413, of the 2nd October 1851, given at page 26 of the Narra printed selections. Without the aid of the bunds and embankments, the greater part of the water would have continued to be wasted in the desert, and the spread of the remainder over the country would have been small, and so slow in rising and retiring, that but a small portion of the land would have been available for the rubbee crop. The subject will also be more fully understood by a consideration of the effect of continued and uncontrolled floods upon the land, which I will now enter upon.

6. When the first flood came down the Narra in 1851, the plain south of Mitrow was, with the exception of a few patches of jungle on the lowest ground near the river, a perfect desert; but since the floods commenced, jungle has sprung up in every direction. In some places it is so dense as to be impenetrable, and in others, where it is less dense, the ground has become covered with a coarse grass called "Kull," which has the effect of weakening the soil, and rendering the cultivation inferior and unremunerative. Land which at first produced beautiful wheat crops has now become unproductive, and but for the works of improvement which have been carried out along the river, and which have had the effect of constantly increasing the spread of the water on to lands still uninjured, the revenue of the Narra would have long ago shown a serious falling off. I have given the subject of the impoverishment of the soil by overflowing very careful attention, and have, on several occasions, brought it to notice. But I may briefly mention here that all lands are thus ruined by the growth of jungle and coarse grasses, unless regularly cleared and cultivated, and this, of course, cannot be effected if the flood does not leave the land before the sowing season commences. Land reduced to this condition will grow rice when well irrigated; but on

the Narra we can only have rice cultivation, which is a *khurreef* crop, to a small extent, and in certain spots, owing to the liability of the country to be flooded.

7. The season the serious injury to the land from overflowing became apparent was that of 1857, when the natural flood supplying the Narra was unusually late. During the month of September of that year the Indus continued high, though the usual inundation period was past, and a heavy flood kept pouring down the left bank districts above Roree, and thence into the head of the Narra, during the whole of that month, and the consequence was the greater part of the valley to the south was under water during the whole of the rubbee sowing season. The spread of the flood was very great that season; but the impossibility of cultivating the land for the rubbee crop caused a serious falling off in the revenue, and thousands of acres of the best land, situated in most favourable spots for annual flooding, were ruined. The revenue was assisted by the *adawah* crop, which was a good one; but could we have had the rubbee crop as well, the revenue realised would have been one-half larger. The amount realised was only Rs. 81,225.

8. There is another important effect the growth of the jungle and grass has, which I may mention here. It checks the flow of the water, and causes it to rise to an undue height against our embankments, and it will be very desirable, even for the security of these works, to effect some alteration which may have the effect of counteracting this to some extent.

9. Having described the condition of the country as it existed after the flood of 1857, I will now allude to the supply channel works, and the Mitrow Canal in connection with them, which were brought into operation during the past inundation. The supply channel and regulating-bridge were completed last year, and the water was formally admitted on the 7th May. The inundation was an unfavourable one, being unsteady and less in volume than any we have had for some years, but still the quantity of water furnished was large, though, of course, far below that of the natural floods which flood the valley at its head completely across. The water reached as far as Trimmoo, and its spread, as well as that of all the previous floods,

is approximately shown on the accompanying map of the Narra, where it passes through the Hyderabad Collectorate. There was no accident to the buuds and embankments; and even on the Mitrow Canal, but a very small portion of which had been executed, irrigation was carried on; and the extraordinary facilities that work will afford for perennial irrigation of the most valuable description, became sufficiently apparent to cause a great deal of excitement among the people, several of whom came forward and offered to execute parts of the canal for moderate rates, provided they might have some of the

Supply channel works, including				land adjacent to cultivate.
regulating-bridge, groin at				The expenditure on the
river bank, and bund across				supply channel works, and
Omerkus Canal	Rs. 6,16,025	9	4	cost of the original surveys
Plantation	806	3	2	of the Narra and all
Mitrow Canal	10,716	5	1	establishments, and the
Salaries — Establishment				Mitrow Canal, up to 1st
and surveying expenses.	1,70,947	9	9	November last, amounts to
Total . Rs.	<u>7,98,595</u>	<u>11</u>	<u>4</u>	

Rs. 7,98,595-11-4, of which the details are given in the margin. The Mitrow Canal was only commenced shortly before the water was admitted, and a great deal of the expenditure on it therefore produced no revenue last season.

10. Some faults, however, became apparent in the works, which will, in a great measure, be remedied before the water is again admitted. The gradient of the supply channel proved too great for the soil in which it has been excavated. The soil, with the exception of a few spots, is either strongly impregnated with salt, or too sandy to bear a strong current, and the consequence was a slight enlargement and much disfigurement of the channel, which, unless speedily checked, would result in the channel working itself into the usual serpentine course of a natural river, and it would cease to be reliable for affording a steady supply of water when the Indus may be at a low level. When the artificial channel was thus affected, I should mention that an exactly opposite process took place in the natural channel of the Narra immediately below. This everywhere underwent a reduction in size, and became more regular in form, from the deposit of silt. A section of the Narra channel, from where the

artificial channel joins it, showing its condition before the opening of the supply channel last year; and the subsequent deposit of silt, accompanies this report. The gradient along the surface of the water in the artificial channel exceeded a foot per mile, while that in the natural channel was less than 4 inches. To prevent further injury to the artificial channel, it is, as you are aware, being lined by Lieutenant Penny with a 6-inch stone-pitching, which last season proved a sufficient protection to the bed and banks wherever it was executed. The pitching has been designed for the whole length of the channel, but I anticipate that the last two miles near the junction with the natural channel will not need complete pitching throughout. It will not be possible to complete them this season; and the silting of the natural channel beyond, and consequent afflux of the water that will continue to take place, will probably sufficiently reduce the action of the stream. During the past inundation the afflux, resulting from the deposit of silt, amounted to upwards of a foot, and during the approaching one I estimate it will increase to two and a-half feet. The natural channel was filled to overflowing last season, and its banks were wrapped up considerably by the silt deposit.

11. When the pitching, now being executed, is completed, the supply channel will be in a most efficient state, and it will have a merit unknown in existing canals in Sind. It will not require an annual clearance, like the Western Narra, the Ghar, or the Fullailee, for the clearance of which we have of late years been compelled to expend such large sums. In my first report on the Eastern Narra, submitting my design for the supply channel, I alluded to the possibility of the mouth becoming encumbered with silt. The result of the first year's trial, however, has removed all my fears on that head. The regulating-bridge was closed on the 30th September; but even at the end of December, when the Indus had fallen to within a few inches of its lowest level, the water was standing without a break from the bridge to the river. I believe that, when canals have their mouths where the river bank is permanent, no serious inconvenience will be experienced from the silt deposit.

12. The second fault that became apparent was the want of embankments on the east bank of the Narra, between Bukkar and

Sirrenwaree. For reasons given in the 2nd paragraph of my report dated 31st October 1853—printed selections,—the escape of the water by overflow into the desert was not stopped between those places, though all the channels which might cause wastage of water when there might be a small supply in the Narra were closed. This season's experience, however, has shown that too much water still escapes from the Narra, and embankments are requisite. Plans, and an estimate amounting to Rs. 7,504, have already been submitted for these works by Lieutenant LeMesurier, the Executive Engineer of the lower Narra, and they will be completed during the present season. The principle on which they have been designed is to have them sufficiently strong on the very low ground to withstand all floods; while on the higher ground a very small elevation has been given to them, that they may be overtopped during extraordinary floods, to afford an escape for surplus water, reduce the head against the other works, and restore the fertility of the soil in the beds of the bunds, which becomes salt, and unproductive from salt springs, unless occasionally subjected to complete submersion.

13. A third fault was the want of a free escape to the water down the channel of the Narra immediately below the village of Kippra. At that point in the river's course the channel is extremely shallow, and since the commencement of the floods in 1851, it has become encumbered with dense jungle. Estimates amounting to Rs. 10,808 for forming a cutting, and Rs. 700 for clearing the jungle, were sanctioned; but I regret to report that, owing to the extraordinary demand for labour last year for the railway works, and the unusually extensive canal clearances undertaken in the Hyderabad Collectorate, only one-half of the work could be executed. It has now been taken in hand again and will be completed before the arrival of the water, and will produce a beneficial result during the approaching season.

14. The revenue that will be obtained from the water of last season will, I regret to state, fall short of Rs. 40,000. The estimated return on which the project was based was, it is true, only Rs. 52,500, but as the large revenue we have obtained in some of the preceding seasons showed the capabilities of the Narra to be greater than was

at first supposed, the comparatively small revenue that will be obtained this season has caused some disappointment. The falling off is, however, attributable to the injury the lands sustained during the natural floods, which, beyond our being able to prevent their wasting towards the desert, may be said to be quite beyond our control. They entered the Narra or ceased flowing, as natural causes directed. But for the injury done to the land the revenue obtained this season would have far exceeded our first estimate. The area of what was formerly good land flooded this year, and which would all have been fit for cultivation but for the previous floods, was not less than 100,000 beegahs, which, at the most moderate rate of assessment, would have yielded Rs. 75,000.

15. There are, however, some circumstances in connection with the revenue this season which promise an improvement in future years, even though nothing further were attempted to develop the scheme. This was the first season during which it was known with certainty beforehand that there would be a supply of water in the Narra, and the result was that numerous kurrias, or small branch canals, were excavated by the people residing along the Narra, to enable them to irrigate their lands. But being the first season many mistakes were made, the most common being that of making the kurria only deep enough to receive water when the Narra is in a flooded condition. The comparatively small artificial supply, of course, flowed along at a much lower level than the former floods, and the consequence was numbers of the kurrias proved of no use. Such as were made properly, however, proved profitable, and enormously so in one or two instances where the levels were favourable. During the next season we may confidently anticipate a considerable improvement in that part of the revenue derived from the kurrias.

16. The Mitrow Canal was only commenced two months before the Narra was opened; and though much activity was displayed by the people in forming their kurrias, the want of time, and difficulty of procuring labourers, limited the extent of cultivation very considerably. A sum amounting to about Rs. 10,000 only had been expended on the canal before irrigation was commenced from it; but so great were the facilities, that the people, notwithstanding the lateness of

the season, succeeded in cultivating about 1,000 beegahs. This work is now being extended as fast as our very limited funds will admit, and before the period arrives for admitting the water into the Narra again, or in about three months from the present time, it will reach the 28th mile of its course ; and as the greatest anxiety has been shown by the people to obtain permission to irrigate from it—the extraordinary facilities for irrigation having even brought some influential men from a considerable distance,—we may safely anticipate a large increase of revenue from the next supply of water.

17. The Fisheries on the Narra have proved more profitable to the contractors this year than they ever did before, and the result will probably be an immediate increase of Rs. 1,000 during the coming season for this item, and a further prospective improvement. The increase in the value of the Fisheries has been caused by the admission of water direct from the Indus by means of the supply channel. Formerly flood water only passed into the Narra, and which, of course, contained fewer fish than the deep stream admitted by the supply channel. Another source of revenue which is generally considered with Fisheries is the wild fowl. The number and variety of aquatic birds to be seen on the Narra this season was truly extraordinary ; and as quite as great facilities for netting them exist as on the Munchur Lake, near Sehwan, they will help to increase the value of the fishing contracts.

18. The injury done to the lands by the floods has led to some discussion as to the best arrangement for ensuring the regular cultivation of such lands, whether by reducing the assessment and granting leases for a fixed number of years, or by allowing a very light assessment indeed for the first two years after land has been cleared of grass and jungle. This will doubtless produce some benefit.

19. The Collector has also under consideration the subject of grazing tax, to be levied on all who bring cattle to the Narra. That this tax is a just one, there can, I think, be little doubt. Before the Narra's improvement was undertaken, the number of cattle was comparatively small. Grass was only to be met with in occasional patches after rain, and the difficulty of getting water for drinking

purposes confined the people to particular spots, and even then they had the labour of constructing wells and raising water, often most impure, from a depth of from 30 to 80 feet. Since the spread of the Narra floods, the country, except where cultivated, has become a vast pasture, and at times, I believe, there have been as many as 40,000 head of cattle brought to the Narra to graze. Many of the coarse grasses, like the "Kull" previously mentioned, afford excellent grazing for cattle, and the value of this in a country like Sind, where there is so little rain, is very great indeed. Within 20 miles of the Narra forage for a horse costs two annas and more per day. A grazing tax, such as is levied on our forest lands near the Indus, would add a considerable sum to the annual revenue.

20. The cutting and jungle clearance immediately below Kipra, which were unfortunately not completed in time last season, will hereafter produce a valuable effect in leading the water further south, and fertilizing land still uninjured south of Trimmoo.

21. All the items of revenue and improvement I have thus enumerated must help to improve the revenue of the Narra, but still, without some further outlay for developing the scheme, the return must continue small, when all the expenses of revenue and engineer establishments and maintenance of works are considered; and all these expenses, I should observe, will be but little added to by any addition to the works. The chief effect of further developing the Narra project will be to improve the revenue without increasing the permanent establishments, which must be maintained whether more works are executed or not.

22. Having thus briefly narrated the leading facts of our treatment of the Narra up to the present time, and shown the revenue derived, and the present state of the country, I may now proceed to enter on the subject of future improvements suggested by the experience we have gained.

23. The management of the Narra would present no doubt or difficulty whatever, were it not for the almost overwhelming floods to which it is liable, and which make their appearance not annually, but at such irregular intervals as to render them difficult to deal with

when they do come, yet affording so uncertain a supply of water as to be wholly unreliable for producing a regular effect, and without such regularity we can have no really good irrigation. In 1851, 1852, 1853, and 1854, there were floods, in 1855 there was none; in 1856 and 1857 there were floods, in 1858 and 1859 there were none. No one can say till the inundation rises whether there will be floods during the coming season or not. We may have a flood heavier than we have ever yet experienced, or we may have none for a period of twenty years.

24. On a consideration of the condition of the Narra lands, the obvious plan that immediately occurs is to embank them, and inundate them on a regular system, to prepare them for the rubber crop. Certain lands might, in this way, be inundated every second or third year, according to their fertility, and in this way the injurious jungle and grasses would be prevented from growing. But a difficulty at once presents itself to any extensive plan of this kind. The passage for floods must be left free in case they should come. We have already incurred great expense in embanking one side of the river to prevent the escape of the water towards the desert, and our embankments have quite as much head of water against them during floods as they can bear. If we now form extensive embankments on the opposite side, we shall certainly expose those already existing to a serious risk. The Narra floods rise sometimes to 80,000 cubic feet per second—a volume which can only escape south by passing across an extensive tract of country, as well as occupying the regular channel. Partial embankments may be constructed here and there on the west bank to preserve limited spots from inundation, but for the present, I am most decidedly opposed to any work of this description above Syud-ke-Gote. Below that neighbourhood we have no embankments, and it may be worth while to attempt something.

25. The plan which I would propose adopting above Syud-ke-Gote, to enable us to keep the water under more control than at present, is to excavate the channel to a much larger size at certain spots, the worst of which is immediately below Kipra. I have requested Lieutenant LeMesurier to prepare plans and estimates for the enlargement of the river channel at those spots, and trust that

officer will be able to carry out the work during next season should sanction be accorded.

26. Below Syud-ke-Gote an attempt at a system of embanking might be made as soon as the land to the south of that place indicates necessity for protection, which it will probably do to some extent next year. I think that the land might be preserved in good order abreast of Omerkote by embanking both sides of the river, but cutting through the embankments alternately. In this way the land on the west side might be subjected to inundation one year, and that on the east side the next. The land from which the inundation might be excluded would, of course, bear a khurreef crop for that season. It cannot, at present, be determined with certainty how far such a system as this will pay. We shall have to make some considerable outlay for the embankments, and there will be the annual expense for maintenance and management; and after all several floods in succession, or at short intervals, like those of late years, may come down the Narra, and lay the whole country under water in spite of our embankments. As long as such floods lasted, of course our trouble and expense would produce but a small result; still the plan is worth a trial, as it is certain that there are some spots which may be embanked at a very trifling cost, and where the people may, perhaps, be induced to undertake some works for this purpose on their own account.

27. With the view of obtaining plans and estimates for the embankments, and deciding how far it will be expedient to carry out the plan, I have requested Lieutenant LeMesurier to have the ground levelled after the approaching season is past, and I hope that officer's plans may be ready before the following working season commences.

28. By undertaking such works as I have described—namely, the enlargement of the channel at the points where it is seriously contracted, and forming embankments to keep the water under some control south of Syud-ke-Gote,—the Narra will undergo all the improvement of which it is susceptible, so long as it is liable to heavy and irregular floods. There will always be abundance of grazing land, and a revenue of about Rs. 1,00,000, without the assistance of floods. When the latter may come in addition, there will be an

increase for the season of from Rs. 50,000 to Rs. 1,50,000, according to the extent of the flood. But without works for the better kind of irrigation, the Narra valley can never yield a revenue bearing anything approaching a proper proportion to the magnitude of the works of supply at Roree. To the consideration of such works I will therefore now proceed.

29. There are along the Narra numerous spots whence water may be withdrawn for canal irrigation, but there are only three good points for heads of canals, security from complete inundation being regarded. The first of these, and the best, is that from which the Mitrow Canal has been carried. This work may be made to yield four lacs of rupees per annum, and it will return 100 per cent. per annum on its cost. So extraordinary are the facilities for its construction, that, as already mentioned in a previous part of this report, it began, within three months of its first commencement, to repay the amount which had been expended on it. Its course is indicated on the accompanying map. It passes through a tract of what is at present desert, but which may be converted into a perfect garden in a few years, with the aid of a constant and abundant supply of water at a proper level. The land along the course of the canal is higher than that flooded to the eastward. The canal will therefore command the irrigation of the whole country to the eastward, and may be used to irrigate the lower lands, whenever such lands may not be fertilized by heavy floods in the Narra. The Mitrow Canal was first suggested by me in 1851; brought forward again in 1853; and final plans and estimates were submitted for sanction in 1855. It was returned three times for alteration, and its commencement, almost in its original form, was finally sanctioned only after a delay of four years. The period for carrying on the work under a restricted expenditure is an unfortunate one; but I trust I may be excused for expressing a hope that this work may be regarded as one of extraordinary importance in its true light, and that, after so many year's delay, it may be carried forward rapidly towards completion, to the advantage of the country, and to the large and immediate pecuniary gain of Government.

30. The second point for a canal head is near Fuqueer-ke-Gote,

about two miles south of Syud-ke-Gote. By embanking the east bank of the Narra for a few miles at this part of its course, a fine tract of land may be made available for perennial irrigation, which would be carried on by the inhabitants of Omerkote and the scattered hamlets in its vicinity. This canal would not be a large one, the extent of country being very limited, but it may prove a very remunerative one, and I have therefore requested Lieutenant LeMesurier to have the country levelled at the same time as the river embankment survey, mentioned in the 27th paragraph of this report, is carried out. The result of these surveys will show how far such a canal is likely to prove remunerative.

31. The third point on the Narra suited for a canal head is at Jamrow, about 25 miles above Mitrow. A large perennial canal might be carried from that point to Karind, along what is now a branch of the Narra during heavy floods. Our general survey of the Hyderabad Collectorate, carried out in 1857 and 1858, showed that the canal might be carried thence almost due south with a fall of 6 inches per mile. Its course is indicated by a red-dotted line. I am under the belief that this work would prove very remunerative, as its supply might at first be turned into several of the old inundation canals, which would at once distribute a large supply of water without further outlay on them. There are, however, difficulties to be encountered between Jamrow and Karind. The country between those places consists of nothing but sand, or very sandy soil, which will require very careful treatment. I should also mention that such a canal would necessitate some alteration and further outlay on the supply channel at Roree, to enable it to furnish the requisite supply of water when the Indus sinks to its lowest level.

32. I am glad to have an opportunity of bringing this project, which was first suggested by Mr. J. W. Barns, to notice; but it is rather with the view of its not being lost sight of, than with any wish to see it carried out immediately. Should the great canal from Roree, the project for which was submitted in 1858, be constructed, the canal from Jamrow may well be deferred for several years.

33. At the commencement of this report, I alluded to the want of experience in the revenues of Sind we had to contend with in the

earlier stages of the Narra's progress, and I would now again briefly refer to the subject.

34. In our treatment of the Narra, we did all that seemed to us judicious at the time, and the immediate result of our works proved that what was done was right. But experience, subsequently gained, has as clearly shown that the works at once undertaken fell far short of what was desirable, and that our revenue might by this time have been certainly five times as large as it is, with a rapid prospective increase.

35. The Mitrow Canal, at first only suggested, and after a delay of two years projected in detail, and finally sanctioned after another and greater delay of four years, should have been projected at the same time as the supply channel, and commenced at the same time.

36. The precarious nature of the revenue on the common inundation canals, arising from the uncertainty of the inundation; the heavy expense and difficulties the cultivators have to contend with in forming and maintaining their deep and imperfect kurrias, and raising water from them with the aid of machinery to the level of the ground; the waste of time, waste of labour, and waste of wealth from obtaining only imperfect crops; these were some of the overwhelming disadvantages but very imperfectly understood ten years back, and under which Sind still labours. This subject is now however, I believe, fully comprehended by all who have a sound knowledge of the country; and I can only conclude this report by expressing a hope that no obstacle may be permitted to stand in the way of works like the Mitrow perennial canal, which will, more than any others, add to the annual revenue of the province, and improve the condition of its people.

I have the honour to be,

Sir,

Your most obedient Servant,

J. G. FIFE, Captain,

Superintendent of Canals in Sind.

*Superintendent of Canals' Office,
Camp Kurrachee, 20th April 1860.*

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**SELECTIONS FROM THE RECORDS OF THE BOMBAY
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No. LXI.—NEW SERIES.

**CAPTAIN CHAMBERS'
REPORT ON IRRIGATION**

FROM THE

TAPTEE RIVER



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1861.

No. 65 of 1860.

From Captain CHAMBERS,
On Special duty in Gujarat,

To the CHIEF ENGINEER and SECRETARY to GOVERNMENT,
Public Works Department.

SIR,—In pursuance with the orders of Government, deputing me to report upon the Rivers of Gujarat, I do myself the honour of submitting the present paper on the Taptee, the river with which I have commenced my investigations.

2. I purpose—first to describe the nature of the Taptee and of its Delta; next to draw out a scheme of combined irrigation and navigation for the Surat Collectorate; and thirdly to compare the cost to be incurred in carrying out this project, with the profits and advantages to be derived from it.

3. The Taptee, though a river of considerable length, drains but a limited area, and that area one which has not the advantage of a great annual rain-fall. It must consequently be put into the same category with the Toongabuddra and the Pennair; in fact, its position

Vide plan No. 17. in the river system of the Indian Peninsula is that of a third class river. The area drained by

it is about 23,000 square miles; whilst the basin of the Toongabuddra is 27,500, and that of the Pennair 21,000. Its water supply, as before stated, is limited, and, as a general rule, in its delta it does not rise in freshes to the top of its banks, but occasionally, as in 1837, it overtops everything, and flows right over the surface of the country, as all other deltaic rivers do unless kept in bounds by levees.

4. The fall of the Taptee within the limits of the Surat Collectorate is as follows:—

From Palree (up to which point high spring-tides ascend) to

• Bhodan—a distance of 8 miles—a slope of $24\frac{1}{2}$ inches per mile.

From Bhodan to the head of the Wagecha rapids—a distance of 7 miles—a rise of $6\frac{1}{2}$ feet per mile.

From Wagecha rapids to the foot of Poona rapids— $6\frac{1}{2}$ miles—a slope of 20 inches per mile.

Up the Poona rapids— $1\frac{1}{3}$ mile in length— $9\frac{1}{2}$ feet per mile.

Next a reach of still-water beyond Mandvie, 4 miles in length.

Finally the Kakrapa rapids, with a fall of $25\frac{1}{4}$ feet within one mile.

5. Beyond this the river-bed consists of a succession of pools, shoals; and rapids, described in extenso in Mr. Edward's report, up to the Heerunkaphal, or deer's leap—the greatest obstruction in the whole course of the Taptee.

6. During the freshes this fall is, of course, more equally distributed; and the rocks in the rapids, if the fresh be a high one, are, for the most part, submerged by the marks pointed out by the villagers. The surface of the river during the great rise of 1837 was as below:—

At Kurrod.....117 feet.	|	At Bhodan.....84 feet.
At Wagecha .....108 ,,	|	At Waracha $41\frac{1}{3}$,,

These figures refer to high-water spring-tide; they cannot be exactly depended upon as critically correct, but are a fair approximation.

7. They give a surface-fall of nearly 3 feet per mile in 11 miles, starting from Kurrod, and of not quite $2\frac{1}{4}$ feet per mile in the remaining 19 miles to Waracha.

8. The surface-fall at the Wagecha rapids is, of course, in excess of these mean falls; and as the greatest depth there during a great fresh would hardly be less than 50 feet, we may assume that the stream has there a surface velocity* of, at least, 11 miles an hour.

9. The mean velocity of the stream below Wagecha during a big fresh, I calculate at not less than from 7 to 8 miles an hour.

10. The bed of the river, where it is not rock, consists of coarse gravel; at the rapids it is composed of an amygdaloid trap in all stages of hardness and of decay, pierced through by dykes of a harder basalt, which, particularly at Wagecha, have the appearance of natural dams through which the stream has forced its way.

11. The banks of the river are generally of tough, yellowish clay, interspersed with layers of kunkur (nodular limestone), and capped with a greater or lesser depth of black alluvial deposit. They are very much torn by ravines ; for though, as in all deltas, the land falls from the bank towards the interior, still at the Taptee some limited amount of drainage finds its way through fissures and gullies into the main stream.

12. In places there are evidences that, before the river cut its way through the obstructions at Poona and Wagecha, it flowed at a higher level during the freshes than it does now ; there are also evidences of its having altered its course within certain defined limits.

13. The mean section of the river in the delta may be taken at 8,500 * square yards ; and throwing out of consideration the width at the rapids, where the river has been obliged to augment its width to attain its full section, its average breadth between its banks may be said to be 1,800† feet.

* Mean of 7 sections.

† Mean of 6 widths.

14. The quantity of water discharged hourly during the great freshes depends so much upon the extent of the river's spill, of which there is no record, that no close approximation can be formed of it ; but I have come to the conclusion that the greatest quantity of water flowing to the sea between the river's banks, when it is full up to their lips, is not less than 120 millions of cubic yards per hour.

15. These freshes, however, last for a short time only, and even the ordinary freshes are of no duration ; indeed, the total quantity of water poured down in the monsoon is comparatively small, and in the cold weather very little.

16. Captain Trevor measured the discharge in the beginning of February 1857, and found it but 100,000 cubic yards per hour ; whilst in May of the present year but 25,000 cubic yards were going down to the sea.

Personal observation.

17. In fact, the tract of country which the Taptee drains is not one enjoying a great rain-fall, excepting always that part of the area traversed by affluents draining a portion of the Western Ghauts.

18. Fresh water comes down the stream in the first week of June, but a decided fresh is rarely experienced till the first week of August.

19. The natural features and the soil of the Surat Collectorate render it well suited for irrigation.

20. The country has been more or less made by the Taptee, and by the smaller rivers flowing from the Ghauts through a trap district to the sea.

21. The smaller rivers to the south increase the expense of the projected irrigation works, inasmuch as the southern duct, to be after described, has to pass them all by aqueducts; but these are not very formidable streams, though their banks are very high.

22. The superficial soil in the delta is, for the most part, black cotton soil, resting on a tough, yellow clay, mixed up with strata of kunkur; this again, as is apparent where a section can be had, such as at the nullahs and smaller rivers before-mentioned, overlies trap-rock.

23. Towards the south a few individual trap hills rise out of the flat country; and singularly enough, in the heart of the delta proper, 3 miles from the Taptee and 20 east from Surat, a small laterite hill crops out.

24. With these trifling exceptions, it may be said that, between the Keem and the Bulsar rivers, there is a tract of country 55 miles in length and 25 miles in average width, the surface of which is no where more elevated than 100 feet above the sea, and therefore under the command of the Taptec, from the point where the water in that river attains that altitude.

25. These 1,375 square miles, which, after deducting for village sites, roads, and boundaries, represent nearly 700,000 acres, belong partly to our Government, and partly to the Guikwar and to the Nawab of Sucheen. Our territory is fully cultivated, the percentage of waste land being small; whilst in the Guikwar's possessions much land, though of excellent quality, is in a state of nature.

26. On the north of the Taptee, in the talúqs of Oolpar and Korsud, the principal produce grown is—cotton 23,000 acres; jowarry—*Sorghum vulgare*—26,500 acres; and wheat 24,500 acres. In the talúqs south of the river—Surbhon, Soopa, Parchole, Chicklee, and Bulsar—cotton is hardly raised at all; but rice, on the contrary, is a great crop. The nature of the principal produce of these five

talúqs is as follows :—rice 26,000 acres ; jowarry 12,000 ; kodra—*Paspalum frumentaceum*—13,000 acres ; castor oil 7,000 acres ; sugar-cane 2,600 acres.

27. Though, as before stated, the percentage of land not taken up to be available land in the seven talúqs is small, being about 15 per cent. only, it must, however, be noted that, of the 270,000 acres taken up, 110,000 are fallow or pasture ; and, as the seven talúqs pay a net land revenue of nearly 12 lacs of Rupees, that the assessment per acre taken up is $4\frac{1}{2}$ Rupees, and of the land actually under crop $7\frac{1}{2}$ Rupees per acre. This is a very heavy average rent when compared with that levied elsewhere in India, but appears to be paid with extreme facility in this district, as is evident by there being no arrears of revenue.

28. The district is well peopled ; deducting Surat city with its population of 90,000 souls, it numbers above 400,000 to 1,768 square miles, or 228 inhabitants for each square mile, and, of course, these are most thickly congregated in the deltaic talúqs ; in these the population is not less than 300 per square mile

29. No advantage whatever is now taken of the Taptee to increase the productiveness of the soil, though it is on record that eighty years ago the water of the freshes was utilized in the growing of cotton.

30. It seems to be thought that irrigation is hurtful to the full-grown plant. From experiment I hold the same opinion, but think that a watering is decidedly of advantage to land in which cotton is about to be sown, and even to the cotton plant itself in its infancy.

31. Be that as it may, there is comparatively with other crops so little cotton grown in the Surat Collectorate, that whether water is beneficial or otherwise to that plant is not matter of supreme importance to the existing agriculture of the province ; but whether the produce of the remaining cultivated land can be increased, at least four-fold, and whether the necessity of allowing two-fifths of the culturable soil to remain fallow can be avoided, certainly is ; and this state of things can most certainly be brought about by irrigation, though, of course, the universal conversion of dry crops into transplanted rice and garden produce would be a matter of time, as it has been found to be elsewhere.

32. It must also not be forgotten that, though for years past, such a thing as a season in which rain has quite failed is unknown in Surat, such a misfortune has occurred before, and may happen again, and that the possession of the command of the water of a river, whose volume is not affected by local rains, almost guarantees a district against drought.

33. I will now attempt to describe a system of irrigation that would change the present condition of the Collectorate into one of greater plenty and greater security, and would, at the same time, open out an access to the coast for considerable tracts of land, which at present are absolutely without any communication of any kind.

34. Some three years back, when the subject of irrigating from the Taptee engaged the attention of Government, Captain Trevor of the Engineers drew out a very interesting report, showing what admirable sites for dams the rocky positions of the rapids in the river afforded, and how easy it was to do over again in Surat what has been so successfully done in Rajahmundry and Masulipatam. From his report, in which a perfect though rough scheme of irrigation was brought forward, and from personal communication with him, I have derived the greatest advantage; the line of levels also taken under his direction up the bed of the river has been found, by two independent lines taken by my parties, to be perfectly correct.

35. From not having the levels of the country on the south bank of the river, Captain Trevor was not aware of the great depth of excavation necessary at the head of the south main duct, and has consequently underrated the probable expenditure in establishing the Surat canal; otherwise what I now propose in detail differs but little in principal from his sketch.

36. Having established the fact, by lines of levels, that a considerable tract of country between the hills and the sea is of very moderate elevation and of alluvial soil, it remained only to determine the site of the proposed irrigation dam. Captain Trevor had pointed out three of these sites—one at the head of each rapid—Kakrapa, Poona, and Wagecha; and on inspecting these localities, and making myself acquainted with the nature and elevation of the adjoining country, I

came to the conclusion that the last of the three sites is the only economically feasible one.

37. This is much to be regretted, for by taking off irrigating ducts from the upper rapids, a greater head of water, and consequently the advantage of being able to irrigate more land, is obtained than when the dam is situated lower down the river. However, the great depth of cutting at the heads of these ducts and the long distance these heads would lie in deep cutting, are against the location of the dam being anywhere else than at the third rapid.

38. The bank at Kakrapa cannot be less than 70 feet above the summer water, whilst that at Poona is 55 feet above it by measurement; even at the selected site, though the bank is unusually low, especially on the north side, there is a crest to be crossed by the south duct, the highest point in which is 67 feet above the summer level at Kamlapoor.

39. It being then an economical necessity to select Kamlapoor as the site of the dam, I proceed to describe the bed of the river there.

40. For four miles in length the rapid appears to be a confused medley of trap-rocks of all shapes, sizes, and heights, traversed by rills of water; but, on becoming better acquainted with its features, one perceives that two separate streams—here deep, there shallow; here in pools, there in rapids and small falls—flow from Kamlapoor to Wagecha pagoda, below which they meet, and then pursue their course—part of the way united, part of the way in two or more channels—to Bhodan; that through the rocky bed of the river, and through the rocky islands that fill the same, basaltic dykes in tolerable parallel lines, their strike being nearly at right angles to the course of the stream, crop out, and stretch from bank to bank; and that in places the débris of the trap-rock in a state of disintegration and the alluvial deposit lodged by the river itself have formed a soil from which not only grasses and bushes derive nourishment, but which even produces trees, though these are submerged during the freshes.

41. In one island in particular the cover is so good that, in the dry weather, tigers are generally to be found on it; during the present season one was shot there.

42. The basaltic dykes have much the appearance of natural dams; and the first idea to strike one is, that a very small outlay would convert them into anicuts; but on close inspection it is apparent that not only has the water cut its way through them, but that, from their being full of faults and split into every conceivable shape, it would, were the present openings blocked up, have no difficulty in repeating the process.

43. I therefore propose to locate the irrigation dam rather above Kamlapoor, at the site shown in plan No. 2, and where there is no rocky dyke in the middle of the stream's bed.

44. The section I propose to adopt is shown in plan No. 3. In my opinion it is needlessly strong, and the third wall might well be dispensed with; but I have preferred to err on the side of safety.

45. The dam has an elevation of 15 feet, my experience of the Kistna anicut not allowing me to propose anything more lofty, and is provided with cast-iron pillars and shutters, which raise the water 3 feet higher. An arrangement of this nature has answered for a year at the Godavery dams, and is to be seen at the escape of the Vehar reservoir. By the dam the water in the Taptee would be elevated from its present summer level of 63 feet to 81 feet above the highest spring-tide, and would stand back to nearly the head of the Poona rapids, through which, for 5,000 Rupees, a passage might be made, and the Mandvie pool connected with the sheet of water below it.

46. It is proposed to give the dam two very powerful surplussluices, also a head or regulating sluice, and a lock to each duct on the north and south banks; the nature of these works is shown in plan No. 3.

47. The anicut itself and all its subsidiary works would rest on stone; indeed, even the lower yard of the excavation of the main ducts themselves would be for some distance in trap-rock, which I look upon as an undoubted advantage, as the stone removed would be used up in the masonry of the dam and of the lock and sluices.

48. It will appear, on reference to plan No. 3 and to the estimate, that the works have been let into the solid rock; but, in execution, I am under the impression that this will hardly be required; the trap in the bed of the river may here and there be not quite solid, in which case it will have to be removed, but most of it will be excellent

as a foundation, and will only need levelling ; the expensive cut-stone aprons designed will also probably not be needed.

49. I propose leading off the ducts with their beds at the level of 75 feet, or 6 feet below the surface-water retained by the anicut, and of giving them only a bottom width of 16 yards ; this will, of course, necessitate a great surface fall ; but the depth to be excavated is against a greater width of section.

50 The fall allowed is $10\frac{1}{2}$ inches per mile, and this by calculation gives a mean velocity of 1.85 miles an hour, and an hourly discharge of 116,200 cubic yards for each duct. This would be the minimum discharge, and, according to the usual allowance of water for rice land, sufficient for above 100,000 acres in the northern, and for the same area in the southern talúqs.

51. This discharge would be the minimum discharge as long as the water in the river was flush with the top of the dam's shutters. Of course, if there were water going to waste over the dam, a greater quantity than 232,400 cubic yards per hour could be poured down the ducts, and this would be the case whenever there was a fresh in the river.

52. The river banks for a few miles above the anicut would have to be looked to, and embanked here and there to prevent a great rise, like that of 1837, turning the works. An allowance is made for this in the estimate, and also for disposing of some local drainage.

53. The cutting at the head of the northern duct is tolerably easy, but just before Gulla, at the 10th mile, there is a piece of heavy work ; the rest of the line to the railway near Roond, near which village the distribution channels should start, is very favourable ; the Engineer can select his own level. I bring the water-surface out near Roond ($21 \text{ miles} \times 10\frac{1}{2} \text{ inches}$), $18\frac{3}{8}$ feet below the water at the anicut, or $62\frac{5}{8}$ feet above spring-tide, which commands the whole of the Government land west of the railway, or an area of not less than 140,000 acres.

54. The drainages crossed by the main canal are not of any great importance. Four aqueducts, the principal one at Gowachy, and four

drainage tunnels are allowed for in the estimate, as well as three bridges.

55. The southern duct is a very formidable piece of work. For the first eight miles to the bifurcation at Mota, I calculated it will cost, at least, as much as eight average miles of Indian railway, but beyond that the levels are extremely favourable.

56. The water-level in the canal comes out at Motá 74 feet above highwater spring-tide, and almost immediately after commands the whole country bounded by it (the canal), the sea, and the Bulsar River, containing 375 square miles of British territory, or above 180,000 acres : of which 120 square miles, or 60,000 acres, are in the immediate neighbourhood of Surat.

57. From Mota I purpose bringing a navigation canal to that city.

58. By section No. 6 it will be seen that it is a still-water navigation, provided with four locks—one without a lift; one with a double lift of 14 feet; and two with lifts of 10 feet each; the surplus drainage of the country to be passed under the line of navigation by three syphonic tunnels, the bottom width of the canal being 40 feet.

59. In the plan the canal terminates at the railway; but there is nothing besides the superstitious reverence entertained by Surat for its wall to prevent it—the canal—being carried under one of the railway viaducts into the town. The levels are quite favourable for this.

60. From above Waracha to beyond Phoolpara, where the country is exposed to inundation, the Taptée would have to be embanked. It is singular why this has never been done before as a protection to Surat. The useless, or, more properly speaking, the mischievous Waracha cut, would, of course, have to be closed.

61. During the monsoon, in fact as long as water was available for irrigation, the northern duct before mentioned, the Surat canal, and the southern duct to Bulsar, to be described below, would be navigable for boats drawing six feet of water; but when the water supply began to fail—say, from the first of January,—it would be advisable to keep the whole of the water for the city; this could be

managed by shutting the head sluice of the northern duct, and by closing the regulating-gates placed in the southern duct immediately after the bifurcation.

* During the dry season.

There would then* be water enough for boats

drawing four feet.

62. Each lock would be bridged.

63. The southern duct, with a fall of $10\frac{1}{2}$ inches per mile, retains its bottom width of 48 feet until the 25th mile from the anicut, where, after throwing off a branch, it is contracted to 40 feet at the bottom.

64. At the end of the 30th mile it throws off another branch, and is again diminished to 35 feet wide at bottom.

65. A similar process is repeated at the end of the 36th mile, where the bottom width is reduced to 30 feet.

66. At the 41st mile the canal no longer has a slope, but is carried on a dead level, and with a bottom width of 48 feet, to the Oorunga River near Bulsar.

67. The water in the canal would, at its terminus at the end of the 50th mile, be 46 feet above highwater spring-tide, and might, if a large trade were developed, be connected with the Oorunga River by a flight of five locks.

68. This line is easy enough to execute, and would not be expensive were it not for the aqueducts at the Mendola, Poorna, Umbeeka, Chicklee, and Kaveree rivers, which, from the height of these rivers' banks, are costly structures.

69. The other masonry works on the southern line are the regulating-gates, mentioned in paragraph 61, five bridges, and eight tunnels, to allow the local drainage intercepted by the canal to pass under it.

70. We now come to the cost of the work—

- | | |
|--|--------------|
| 1. The dam and its head works, including some banking and much plant | Rs. 4,50,000 |
| 2. The northern duct and its bridges, &c., 21 miles of canal | 5,49,500 |

Carried over . . Rs. 9,99,500

	Brought over..	Rs. 9,99,500
3.	The southern duct, 50 miles long, with masonry works	15,42,512
4.	The Surat canal, 22 miles in length, with its masonry works, and the embankment at Waracha.....	4,25,400
5.	Principal branches, 140 miles in length, with falls, bridges, and sluices, 1,200 Rupees a mile	1,68,000
6.	Distribution channels, 300 miles in length, with falls, bridges, and sluices, 500 Rupees a mile.	1,50,000
7.	Drainage cuts	50,000
8.	Improvement of barrier at Poona	5,000
9.	Sundries and superintendence at 10 per cent..	3,34,588
	Total..Rupees	<u>36,75,000</u>

71. The rates used in making these calculations have been taken partly from the schedule of rates of the Bombay and Baroda Railway, and from those obtaining in the range of the Executive Engineer at Surat, and partly from personal experience of what similar works have cost on the east coast of India. I have taken care to add from 50 to 200 per cent. on to the Godavery and Kristnah prices, and have endeavoured, in every instance, to over-estimate instead of under-reckoning the cost of the works.

72. The earthwork in particular has its price assimilated to what it is said to cost in Surat, though similar work in Rajahmundry and Masulipatum would cost from two-fifths to one-half of what has been put down in the estimate, the wages paid for predial labour being the same in the three provinces.

73. At present wages have been run up at Surat by the railway to abnormally high rates, but as soon as the line is completed the price of labour will find its level; and though it will not, of course, go down to what it was before the present excessive rates obtained, it will, without doubt, be much less than at present, and will allow of irrigation works being executed at a tolerably moderate cost.

74. Stone, lime, sand, and firewood are found at the site of the main dam, and never far distant from any of the proposed subordinate masonry works; and, as before observed, there are from 200 to 300 inhabitants per square mile in the country traversed by the proposed canals; it thus appears that both materials and labour are easily procurable.

75. With respect to the money returns to be expected from the project, putting aside all indirect returns, which, in schemes of this nature, are generally far greater than the amount of money directly levied; taking no account whatever of what use may be made of the water by the inhabitants of the Guikwar's territories; and premising that no charge is to be made for the free navigation of the northern and southern ducts, and of the Surat canal during the monsoon, and of the latter channel during the dry weather; but assuming that a water cess of 2 Rupees an acre will be put upon all land irrigated, they may be taken as certain to be, at least, four lacs of rupees yearly when the whole of the water supplied is made use of.

76. Of these four lacs of rupees, 25,000 Rupees would have to be paid yearly as salaries to the canal officers and their subordinates, and 75,000 Rupees per annum for repairs, leaving three lacs of rupees to pay interest on 36,75,000 Rupees, or somewhat over 8 per cent.

77. The sections of the canals have been calculated to give a minimum discharge up to certainly the 1st of December, and most likely to the 1st of January, sufficient for 232,400 acres. The area of the land in the British territory available for irrigation is, at least, 320,000 acres; consequently, there is neither land to be irrigated wanting, nor water to irrigate it with, and the works once completed, the eventual irrigation of 200,000 acres may be accepted as a certainty.

78. The water cess proposed is extremely moderate; for though, as before stated, the average assessment of the land taken up in the Collectorate is $4\frac{1}{2}$ Rupees an acre, there are lands—rice, garden, and dry—paying respectively as much as $32\frac{1}{2}$, 32, and $25\frac{1}{2}$ Rupees an acre, showing what a high assessment land can pay in Surat when

the soil is good, or means of watering it are in existence ; it is even asserted that 120 Rupees a bigah* are paid to the Guikwar as the rent of certain sugarcane land in the Gundavee Purgunna.

* 587 of an acre.

79. This being the case, when it is considered how advantageous water is to the soil in India, not only in stimulating vegetation, but in actually supplying the soil with manure, so that the necessity of letting land lie fallow is done away with, it is evident that a much greater water rate than 2 Rupees an acre might well be imposed, and the ryot still be enormously the gainer by irrigation.

80. It would be easy by proposing to levy a heavy water rate, such as is paid by irrigated lands in Khandeish and elsewhere ; by proposing to put on tolls on the lines of navigation ; and by referring to the indirect returns of Rajahmundry, where the revenue has increased from twenty to thirty lacs a year in twelve years, without the imposition of any water rate whatever, to show a much greater probable profit on the proposed outlay of $36\frac{3}{4}$ lacs of Rupees than has been done above, but I prefer being moderate in my estimation of probable returns.

81. Even if, by putting on a heavy rate on the use of water supplied by any scheme of irrigation, it were certain that Government would be greatly financially advantaged, I should doubt the justice as well as the policy of so doing, and particularly so in the Surat Collectorate.

82. This is a district that has been very hardly treated. It has been in our possession above fifty years, and has annually paid a revenue of from fifteen to twenty-three lacs of rupees to the State, without any return to speak of in the shape of public works being made to it.

83. Its gross revenue for 1858-59 was above twenty-seven lacs of rupees, its net revenue being $22\frac{1}{2}$ lacs ; its exports for 1859-60 were $68\frac{1}{2}$ lacs, its imports $117\frac{1}{4}$ lacs ; and yet there is neither road, nor bridge, nor irrigation work established by Government to be found in the whole district ; its principal river's bed is shoaling up for want of a common dredge ; and for five months of the year, though the average rain-fall is not over 35 inches, all movement is absolutely at a stand-still, the country being no where passable for a cart.

84. With the exception of the railway to Baroda (a work under execution by a private company); a pleasure drive ten miles in length to Domus; and a bit of a wooden wharf, lately built at Surat out of port dues, are all the external signs the Collectorate has to show that it has been in the hands of the British since the beginning of the century.

85. Road metal and sand are procurable within moderate distances throughout the Collectorate; but the description given by Mr. Mackay in his book of the tracts, misnamed roads, is just as true now as it was eight years ago; if anything, he has understated the case.

86. Even if the scheme of irrigation and navigation, sketched out in this paper, were not likely to yield more than the very moderate return I have supposed it will, its execution appears to me to be almost a debt of justice towards a district that has been so utterly neglected. If financial difficulties prevent the work from being undertaken out of current revenue, it is one which, like the Toongubuddra project now under execution, might well be carried out by a private company under a guarantee.

87. In conclusion I will, in a few words, give a resume of this report—

1st.—That the Taptee is a river with excellent sites for an irrigation dam; and the country under the command of such a dam is well suited for irrigation.

2nd.—That there is water enough in the river for, at least, 200,000 acres of land, from the middle of June to the 1st of December, if not longer; and there are on both banks of the river 200,000 acres of land so situated as to be perfectly irrigable.

3rd.—That the proposed scheme of combined irrigation and navigation is a perfectly easy one from an engineering point of view, but expensive, owing to the heavy cuttings at the heads of the main ducts; to the nature of the country to the south of the Taptee, which is traversed by several broad and deep streams; and to the fact that much of the best land in the delta is not British territory.

4th.—That, with these drawbacks, a return of 8 per cent. on the proposed outlay of $36\frac{3}{4}$ lacs may confidently be anticipated by means of a water rate of 2 Rupees an acre on the land irrigated, besides indirect profits and advantages.

5th.—That this rate, if compared with what land elsewhere pays for water, is an extremely moderate one.

6th.—And that finally, so little has been done for the Collectorate since it has been a British possession, that Government might well take in hand works which would greatly benefit and enrich the district, even if they did not yield a large remunerative return to the State.

I have the honour to be,

Sir,

Your most obedient Servant,

OSBORN CHAMBERS,

On Special duty.

Surat, 1st October 1860.

APPENDIX.

LIST AND DESCRIPTION OF THE PLANS ACCOMPANY- ING THE REPORT.

1. General plan of the Surat Collectorate, showing the location of the irrigation dam, as well as the lines taken by the proposed canals, and exhibiting the general levels of the delta.
2. Sketch showing the nature of the rocky bed of the Taptee at the proposed site of the dam; the location of the heads of the main ducts, and the levels of the country through which they pass.
3. Plan and section of the proposed dam, and of its accessory head works.
4. Rough sketch to exhibit the position of the locks in the Surat canal.
5. Section showing the nature and fall of the bed of the Taptee from Mandavie to Bhodan.
6. Section along the Surat canal.
7. Section along the first 30 miles of the southern duct.
8. Section along the first 12 miles of the northern duct.
9. Plan of the country traversed by a line of levels from Waracha to Bardolee.
10. Plan of the country traversed by a line of levels from Bardolee to Waracha and Kurrod.
11. Plan of the country traversed by a line of levels from Waracha to Gulteswar and Wagecha,—2 sheets.
12. Plan of the country traversed by a line of levels from Bhodan to Bulsar,—2 sheets.
13. Plan of the country traversed by a line of levels from Kosaree on Taptee to Railway at Roond,—2 sheets.
14. Sections taken across the Taptee.
15. Ditto ditto.
16. Sections taken across the drainages passed over by the proposed canals.

17. Sketch showing the areas drained by the Taptee and the Toongabudra rivers.
18. Sketch of an aqueduct and of a syphonic drainage tunnel.
19. Sketch of a lock of 10 feet lift, and of a canal bridge.
20. Curve for taking off the cost of a mile of canal at any depth, when the bottom is 48 feet wide, and the side slopes 1 to 1.

ABSTRACT OF THE ESTIMATE FOR PUTTING AN IRRIGATION DAM ACROSS THE TAPTEE, AND LEADING OFF CANALS FROM THE SAME TO IRRIGATE THE SURAT COLLECTORATE.

Cost of dam alone.....	Rs. 2,03,874.56
Do. of its accessory works	1,74,000
Do. of banking and improving the river above the dam's site	20,000
Do. of plant.....	52,125.44
Do. of earthwork of northern duct	4,16,700
Do. of four aqueducts in northern duct ..	98,360
Do. of four syphonic drainage tunnels in northern duct	20,000
Do. of three bridges across the duct	14,400
Do. of earthwork of southern duct	11,23,622.5
Do. of a pair of regulating-gates at the bifur- cation.....	5,000
Do. of five large aqueducts in southern duct.	3,41,640
Do. of one large syphonic tunnel under southern duct.....	15,000
Do. of seven small syphonic tunnels under southern duct	35,000
Do. of four bridges over southern duct	22,250
Do. of earthwork of Surat canal.....	2,34,200
Do. of 4 locks in the same, one a double lock.	1,56,200
Do. of one surplus sluice at terminus.....	5,000
Do. of three drainage under-tunnels	15,000
Do. of embanking the Taptee near Waracha.	15,000
Do. of 140 miles of principal branches, with their accessory works, at Rs. 1,200 a mile.	1,68,000
Do. of 300 miles of distribution channels, with their masonry works, at Rs. 500 a mile.. ..	1,50,000

Cost of drainage cuts	50,000 .
Do. of removing obstructions in the Taptee at Poona	5,000
Add.—Sundries, contingencies, superinten- dence, &c., at 10 per cent	3,34,587.5
Grand total.. Rupees	<u>36,75,000</u>

ESTIMATE OF THE EXPENSE OF CONSTRUCTING AN ANICUT ACROSS THE TAPTEE AT KURLAPOOR.

Section of first wall of anicut—

Apron and basement $30 + 2 + 9 + 4\frac{1}{2} + 5 = 50\frac{1}{2} \times 4' = 202$ sq. ft.

Body of wall $\frac{9+15\frac{1}{2}}{2} \times 15 = 12\frac{1}{4}' \times 15' = 183\frac{3}{4}$

Total .. $385\frac{3}{4}$

Deduct cut-stone.. $39' \times 1\frac{1}{2}' = 58\frac{1}{2}$

— $327\frac{1}{4}$ sq. ft.

Section of second wall—

Apron and basement $20 + 9 + 3 + 4 = 32' \times 4' = 128$ sq. ft.

Body of wall $\frac{9+5}{2} \times 7\frac{1}{2}' = \frac{14}{2}' \times 7\frac{1}{2}' = 52\frac{1}{2}$

Total.. $180\frac{1}{2}$

Deduct cut-stone.. $25' \times 1\frac{1}{2}' = 37\frac{1}{2}$

— 143 sq. ft.

Section of third wall—

Apron and basement $16' \times 4' = 64$ sq. ft.

Body of wall..... $3' \times 1\frac{1}{2}' = 4\frac{1}{2}$

Total.. $68\frac{1}{2}$

Deduct cut-stone.. $13' \times 1\frac{1}{2}' = 19\frac{1}{2}$

— 49 sq. ft.

Grand total .. $519\frac{1}{4}$

square feet to each running foot of section.

Cut-stone as above—

First wall	58½ square feet.
Second wall	37½ „
Third wall	19½ „

Grand total .. 115½ square feet to each running
foot of section.

And the length of anicut being 1,577 feet, $\overline{1577'} \times 519\frac{1}{4}'$
= 818,857½ cubic feet rubble masonry, and $1577' \times 115\frac{1}{2}'$
= 182,143 cubic feet of dressed stone.

ANICUT.	{	818,857½ cubic feet of rubble, at Rs. 16 the	
		100 cubic feet	Rs. 1,31,017·16
		182,143½ cubic feet of dressed stone, at Rs. 40	
		the 100 cubic feet	72,857·4
		Two guard or head locks, 120' by 16' within	
		their chambers, at Rs. 35,000 each	70,000
		Two head or main irrigation sluices, with eight	
		vents, each 6 feet in width, at Rs. 12,000	
		each	24,000
		Two surplus or under-sluices for keeping the	
heads of the locks and irrigation sluices			
clear of deposit, each with twenty vents,			
6 feet in width, at Rs. 25,000 each	50,000		
Two sets of approach walls, revetments, groynes,			
&c., at Rs. 15,000 each set	30,000		
Banking at Kurrod, and otherwise protecting			
the river bank above anicut	20,000		
Plant	52,125·44		
Grand total . . Rupees			<u>4,50,000</u>

**ESTIMATE OF THE COST OF THE NORTHERN DUCT,
48 FEET WIDE AT BOTTOM, SLOPES 1 TO 1.**

** Water level 81 feet above Highwater Spring-tide. Sole of
Channel 75 feet.*

No. of Miles.	Mean of Sole.	Mean of Surface.	Mean of Cutting.	Cost of Canal.	Remarks.
	Feet.	Feet.	Feet.	Rs.	
1	74 $\frac{1}{8}$	103	28 $\frac{1}{2}$	77,500	
2	73 $\frac{1}{8}$	98	24 $\frac{1}{2}$	59,200	
3	72 $\frac{1}{8}$	82 $\frac{1}{2}$	9 $\frac{1}{2}$	15,400	Rs. 2,000 banking.
4	71 $\frac{1}{8}$	80 $\frac{1}{2}$	8 $\frac{1}{2}$	12,700	
5	71 $\frac{1}{8}$	78 $\frac{1}{2}$	7 $\frac{1}{2}$	10,500	Rs. 2,000 banking.
6	70 $\frac{1}{8}$	80	9 $\frac{1}{2}$	15,400	Rs. 2,000 banking.
7	69 $\frac{1}{8}$	86	16 $\frac{1}{2}$	33,200	
8	68 $\frac{1}{8}$	75	6 $\frac{1}{2}$	9,200	Rs. 2,000 banking.
9	67 $\frac{1}{8}$	85 $\frac{1}{2}$	18	37,200	
10	66 $\frac{1}{8}$	77	10 $\frac{1}{2}$	16,500	
11	65 $\frac{1}{8}$	After this one can select any level; but as the country undulates, we should allow for 7 $\frac{1}{2}$ feet of cutting.	7 $\frac{1}{2}$	10,900	Rs. 2,000 banking.
12	64 $\frac{1}{8}$		7 $\frac{1}{2}$	10,900	
13	64 $\frac{1}{8}$		7 $\frac{1}{2}$	10,900	
14	63 $\frac{1}{8}$		7 $\frac{1}{2}$	10,900	
15	62 $\frac{1}{8}$		7 $\frac{1}{2}$	10,900	
16	61 $\frac{1}{8}$		7 $\frac{1}{2}$	10,900	
17	60 $\frac{1}{8}$		7 $\frac{1}{2}$	10,900	
18	59 $\frac{1}{8}$		7 $\frac{1}{2}$	10,900	
19	58 $\frac{1}{8}$		7 $\frac{1}{2}$	10,900	
20	57 $\frac{1}{8}$		7 $\frac{1}{2}$	10,900	
21	57 $\frac{1}{8}$		7 $\frac{1}{2}$	10,900	
				4,06,700	
Add for banking .. Rs.				10,000	
Total cost of earthwork. . Rs.				4,16,700	

Aqueduct at Gowachee (height of springing 11 $\frac{1}{2}$ feet), five arches of
40 feet span, exterior width 33 feet, 228 feet run, at Rs. 120 per
running foot Rs. 27,360

Aqueduct at Peepulda nullah at 6th mile (height of springing 32 feet),
two arches of 40 feet span, exterior width 33 feet, 87 feet run, at
Rs. 200 a running foot 17,400

Carried over. . Rs. 44,760

Brought forward.. Rs.	44,760
Aqueduct beyond Bhodan at 9th mile (height of springing 37 feet, exterior width 30 feet), 3 arches of 40 feet span, 134 feet run, at Rs. 200 a running foot.....	26,800
Aqueduct beyond Veerpoor at 15th mile, similar to the last	26,800
Four drainage tunnels at 4th, 12th, 17th, and 18th miles, at Rs. 5,000 each	20,000
Three bridges at 7th, 12th, and 16th miles, 48 feet span, 18 feet exterior width, at Rs. 4,800 each	14,400
Total.. Rs.	1,32,760
Total cost of Earthwork.. Rs.	4,16,700
Total of Northern Duct.. Rs.	5,49,460

ESTIMATE OF THE COST OF THE SOUTHERN DUCT, 48 FEET AT BOTTOM, SLOPES 1 TO 1.

*Water level 81 feet above Highwater Spring-tide. Sole of Channel
75 feet. Fall $10\frac{1}{2}$ inches per Mile.*

No. of Miles.	Mean of Sole.	Mean of Surface.	Cutting.	Cost of each Mile, with a bottom width of 16 Yards.	Remarks.
	Feet.	Feet.	Feet.	Rs.	
1	74 $\frac{8}{16}$	107 $\frac{1}{4}$	33	1,00,127·5	
2	73 $\frac{11}{16}$	108	34 $\frac{1}{4}$	1,06,452·5	
• 3	72 $\frac{3}{8}$	110	37 $\frac{1}{4}$	1,23,887·5	
4	71 $\frac{5}{8}$	108	36	1,16,875·5	
5	71 $\frac{1}{8}$	99	28	75,200	
6	70 $\frac{3}{8}$	98	27 $\frac{3}{4}$	74,000	
7	69 $\frac{6}{8}$	95	25 $\frac{3}{4}$	65,400	
8	68 $\frac{7}{8}$	89	20 $\frac{1}{2}$	45,400	
Total of Bifurcation.. Rs.				7,07,342·5	

ESTIMATE OF THE COST OF THE CANAL INTO SURAT, 40 FEET AT BOTTOM, SLOPES 1 TO 1.

No. of Miles.	Mean of Sole.	Mean of Surface.	Depth of Cutting.	Cost of each Mile.	Remarks.
	Feet.	Feet.	Feet.	Rs.	
9	67 9-16	84½	17	29,500	
10	66 11-16	81½	14½	24,000	
11	65 13-16	78½	13	19,900	
12	64 15-16	76½	11½	17,400	
13	64 1-16	73½	9½	13,500	
14	63 3-16	71½	8	10,300	
15	62 5-16	68½	6½	7,900	
16	61 7-16	66½	4½	5,300	
17	60 9-16	63½	3½	3,400	Rs. 2,000 banking.
Here a double lock of 14 feet drop-banking..				2,000	
18	15 11-16	61½	15½	26,200	
19	44 13-16	56½	8	10,300	
20	13 15-16	50½	6½	7,500	
21	43 1-16	43	..	8,900	Surface of water 50½ ft. ; 7½ ft. of banking single lock.
22	32 3-16	40	7½	9,900	
23	31 5-16	35	3½	4,000	*Rs. 1,000 banking.
24	30 7-16	32½	2½*	3,400	† Surface of water
25†	29 9-16	30	½	8,100	36½ ft. ; 6½ ft. of banking lock.
26	19 1-8	28	9	12,000	
27	19 1-8	26	7	8,700	
Total of Earthwork.. Rs.				2,34,200	
Add.—Single lock without lift at bifurcation, and its subsidiary fall...				Rs.	
Double lock of two lifts of 7 feet each, at 17th mile, with its fall.				20,000	
Single lock of 10 feet lift, at the 21st mile, with its fall				56,200	The chambers of these locks are each 120' × 16'. Each of these locks is bridged.
Single lock of 10 feet lift, at the 25th mile, with its fall				40,000	
Surplus sluice at the end of canal, discharging either into Taptee or into salt nullah				40,000	
Three drainage under-tunnels at the 8th, 17th, and 25th miles, Rs. 5,000 each				5,000	
Total.. Rs.				1,76,200	
Embanking Taptee at Waracha.. Rs.				15,000	
Total of Earthwork.. Rs.				1,91,200	
Grand total of the Surat Canal.. Rs.				2,31,200	
				4,25,400	

Southern Duct continued from Bifurcation.

No. of Miles.	Mean of Sole.	Mean of Surface.	Mean of Cutting.	Cost of each Mile.	Remarks.
	Feet.	Feet.	Feet.	Rs.	
9	67 9-16	83	15½	29,500	
10	66 11-16	79	12½	21,000	
11	65 13-16	79	13½	23,500	
12	64 15-16	72	7	10,000	
13	64 1-16	72	8	11,900	
14	63 3-16	71	7½	11,400	
15	62 5-16	70	7½	11,400	Rs. 2,000 banking.
16	61 7-16	69	7½	10,900	Rs. 2,000 banking.
17	60 3-16	69	8½	12,700	
18	59 11-16	68	8½	12,400	
19	58 13-16	66	7½	10,500	
20	57 15-16	67	9	13,900	
21	57 1-16	64	7	10,000	
22	56 3-16	60	3½	4,900	
23	55 5-16	55	½	8,300	Six feet banking.
24	54 7-16	58	3½	4,500	Bottom width reduced to 40 feet.
25	53 9-16	62	8½	11,150	
26	52 11-16	60	7½	9,100	
27	51 13-16	56	4½	4,700	
28	50 15-16	60	9	12,000	
29	50 1-16	60	10	13,900	
30	49 3-16	50	¾	7,150	Six feet banking.
31	48 5-16	After this a line can be taken, which will keep the mean cutting at six feet.	6	6,360	Bottom width reduced to 35 feet.
32	47 7-16		6	6,360	
33	46 9-16		6	6,360	
34	45 11-16		6	6,360	
35	44 13-16		6	6,360	
36	43 15-16		6	6,360	
37	43 1-16		6	5,580	Bottom width reduced to 30 feet.
38	42 3-16		6	5,580	
39	41 5-16		6	5,580	[creased to 48 feet.
40	40 7-16		6	5,580	Bottom width in-
41	40		6	8,300	Rs. 2,000 banking.
42	40		6	8,300	Rs. 2,000 banking.
43	40		6	8,300	
44	40		6	8,300	
45	40		6	8,300	
46	40		6	8,300	
47	40		6	8,300	
48	40		6	8,300	
49	40		6	8,300	
50	40		6	8,300	
				4,08,280	
Banking.. Rs.				8,000	
Total.. Rs.				4,16,280	

	Brought over.. Rs.	4,16,280
<i>Add.</i> —The Mendolee aqueduct (height of springing 33 feet), seven arches of 40 feet span, and outside width 33 feet, 322 feet run, at Rs. 180 per running foot		57,960
Porna aqueduct (height of springing 43 feet), nine arches of 40 feet span, exterior width 33 feet, 416 feet run, at Rs. 220 per running foot		91,520
Ambeeka aqueduct (height of springing 37 feet), eleven arches of 40 feet span, 570 feet run, at Rs. 200 per running foot..		1,02,000
Chicklee River aqueduct (height of springing 25 feet), seven arches of 40 feet span, exterior width 33 feet, 322 feet run, at Rs. 150 per running foot		48,300
Karera aqueduct (height of springing 17 feet), seven arches of 40 feet span, exterior width 33 feet, 322 feet run, at Rs. 130 per running foot.....		41,860
One pair of regulating-gates set in masonry		5,000
Seven drainage syphonic tunnels, at Rs. 5,000 each, at the 9½, 27th, 36th, 37th, 43rd, 45th, and 48th miles.....		35,000
One large drainage syphonic tunnel of five vents of 10 feet span, at the 35th mile.....		15,000
One bridge at the 11th mile of 48 feet span, and 18 feet exterior width, at Rs. 100 per running foot		4,800
One bridge at the 19th mile of do. at do.		4,800
One bridge at the 26th mile of 40 feet, at Rs. 100 per running foot		4,000
One bridge at the 36th mile of 35 feet, at Rs. 110 per running foot		3,850
One bridge at the 54th mile of 48 feet, at Rs. 100 per running foot		4,800
		<hr/>
	Total. . Rupees	8,35,170
<i>Add.</i> —The eight first miles of Canal. . Rupees		7,07,342·5
		<hr/>
	Total cost of Southern Duct. . Rupees	<u>15,42,512·5</u>

Table showing the cost of one running yard of Canal excavation at various depths, when the first cubic yard is removed, at an estimated cost of 2 Annas, and each succeeding cubic yard at $\frac{1}{4}$ of an Anna more, the bottom of the Channel being always 48 feet wide, and the side slopes 1 to 1.

Depth of Cutting in Feet.	Square Yards of Section to each Yard in Depth.	Rate per Yard in Annas.	Cost of each Running Yard of Canal excavation, at depths varying from 30 feet to 3 feet, in Annas.											
36	39	2	78											
33	37	2 $\frac{1}{4}$	83 $\frac{1}{4}$	74										
30	35	2 $\frac{1}{2}$	87 $\frac{1}{2}$	78 $\frac{1}{2}$	70									
27	33	2 $\frac{3}{4}$	90 $\frac{3}{4}$	82 $\frac{3}{4}$	74 $\frac{3}{4}$	66								
24	31	3	93	85 $\frac{1}{2}$	77 $\frac{1}{2}$	69 $\frac{1}{2}$	62							
21	29	3 $\frac{1}{4}$	94 $\frac{1}{4}$	87	79 $\frac{1}{4}$	72 $\frac{1}{4}$	65 $\frac{1}{4}$	58						
18	27	3 $\frac{1}{2}$	94 $\frac{1}{2}$	87 $\frac{3}{4}$	81	74 $\frac{1}{2}$	67 $\frac{1}{2}$	60 $\frac{3}{4}$	54					
15	25	3 $\frac{3}{4}$	93 $\frac{3}{4}$	87 $\frac{1}{2}$	81 $\frac{1}{2}$	75	68 $\frac{1}{2}$	62 $\frac{1}{2}$	56 $\frac{1}{2}$	50				
12	23	4	92	86 $\frac{1}{4}$	80 $\frac{1}{2}$	74 $\frac{1}{2}$	69	63 $\frac{1}{2}$	57 $\frac{1}{2}$	51 $\frac{1}{2}$	46			
9	21	4 $\frac{1}{4}$	89 $\frac{1}{4}$	84	78 $\frac{1}{4}$	73 $\frac{1}{4}$	68 $\frac{1}{4}$	63	57 $\frac{3}{4}$	52 $\frac{1}{4}$	47 $\frac{1}{4}$	42		
6	19	4 $\frac{1}{2}$	85 $\frac{1}{2}$	80 $\frac{3}{4}$	76	71 $\frac{1}{2}$	66 $\frac{1}{2}$	61 $\frac{3}{4}$	57	52 $\frac{1}{2}$	47 $\frac{1}{2}$	42 $\frac{3}{4}$	38	
3	17	4 $\frac{3}{4}$	80 $\frac{3}{4}$	76 $\frac{3}{4}$	72 $\frac{3}{4}$	68	63 $\frac{3}{4}$	59 $\frac{3}{4}$	55 $\frac{3}{4}$	51	46 $\frac{3}{4}$	42 $\frac{3}{4}$	38 $\frac{3}{4}$	34
Total cost of one Running Yard in Annas			1062 $\frac{1}{2}$	910 $\frac{1}{4}$	771 $\frac{1}{4}$	645	531	428 $\frac{1}{2}$	337 $\frac{3}{4}$	257 $\frac{1}{2}$	187 $\frac{1}{2}$	127 $\frac{1}{4}$	76 $\frac{1}{4}$	34
Depth of Cutting in. . Feet			36	33	30	27	24	21	18	15	12	9	6	3

Depth in Feet.	Cost of Canal per Running Yard.	Table showing the Cost of Canal per Mile at various depths, from 3 to 36 feet.
	As.	Rs.
3	34	3,740·0
6	76½	8,387·5
9	127½	13,997·5
12	187½	20,625·0
15	257½	28,325·0
18	337½	37,152·5
21	428½	47,162·5
24	531	58,410·0
27	645	70,950·0
30	771½	84,837·5
33	910½	1,00,127·5
36	1,062½	1,16,875·0

Schedule of Prices of Work done in Surat Collectorate.

Description of Work.	Rate per Cubic Yard or Foot as charged by the B. B. & C. I. R.	Rate per Cubic Yard or Foot as charged by Executive Engineer in Surat.	Remarks.
	Rs. a. p.	Rs. a. p.	
Digging and removing earth from a pit to an embankment, pit one yard deep, and distance spoil is carried 25 yards from centre of pit to centre of bank.	0 2 0	0 2 3	[annas a day, 9 pice. wages are from 2 to 3 At the Kistna, where
Ditto ditto when pit is 2 yards deep	0 2 3	0 2 6	11 pice at same place.
Ditto ditto when pit is 3 yards deep	0 2 6	0 2 6	1 anna 1 pice „
Ditto ditto when pit is 4 yards deep	0 3 0	0 3 1	1 anna 3 pice „
Cubic yard of best brickwork in basement of a building	6 0 0	5 0 0	
Ditto ditto when above plinth	6 8 0	5 8 0	
Ditto ditto when scaffolding is used	7 8 0	6 0 0	
Cubic yard of rubble work not dressed but slightly hammered ..	From { 6 0 0 } To { 8 0 0 }	No work done by this office	} At Kistna Rs. 2½
Sq. yard of cut-stone flooring, one foot in depth ..	4 8 0*	5 0 0*	
Teak wood (Burmese) squared and put up, per cubic foot	3 0 0	3 0 0	[Malabar teak. Executive Engineer uses
Ditto country ditto ..	2 4 0	2 0 0	

Table showing the Value of the Trade by Sea of the Surat Collectorate with Bombay and Foreign Countries.

Names of Ports.	For 1858-59.			For 1859-60.		
	Exports.	Imports.	Total.	Exports.	Imports.	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Parnera	2,42,612	38,730	2,81,342	2,40,372	29,490	2,69,862
Bulsar ..	10,03,342	5,19,710	15,23,052	10,98,911	9,20,072	20,18,983
Parchole..	2,27,428	51,560	2,78,988	2,41,864	58,571	3,00,376
Murolee .	6,876	6,225	13,101	48,471	2,35,909	2,84,380
Surat ..	61,33,139	92,67,825	1,54,00,964	52,10,977	1,04,88,415	1,56,99,393
Oolpar ..	31,864	3,534	35,398	27,904	3,403	31,307
Total. Rs	76,45,261	98,87,584	1,75,32,845	68,68,499	1,17,35,806	1,86,04,301

Statement showing the different Rates of Assessment per Bigah prevailing in the Deltaic Taluqs of the Surat Collectorate, prepared from Returns for 1848-49.

No.	Taluqa.	Jurayet or Dry Crop Land.		Baghayet or Garden Land.		Kecaree or Rice Land.	
		Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Oolpar	15 0 0	1 0 0	3 8 0	3 8 0	10 6 0	2 0 0
2	Koorsud	9 8 0	1 0 0	17 10 0	4 0 0	9 8 0	2 0 0
3	Chowrassee	11 6 0	1 0 0	18 12 0	1 0 0	18 14 0	2 0 0
4	Surbhone	10 0 0	1 12 0	15 0 0	3 4 0	16 8 0	4 0 0
5	Soopa	6 0 0	1 0 0	18 0 0	2 8 0	15 0 0	1 14 0
6	Parchole	5 0 0	0 8 0	17 0 0	2 12 0	15 0 0	1 5 6
7	Chicklee	9 6 0	1 2 0	10 4 0	2 4 0	15 0 0	2 14 0
8	Bulsar	6 0 0	0 8 0	14 0 0	3 0 0	14 0 0	2 14 0

To reduce the assessment per bigah to that per acre, multiply the rates in the table by 1·7.

Nature of Produce raised in the eight Deltaic Taluqs of the Surat Zillah.

Description of Produce.	Onpar Bigahs.	Korad Bigahs.	Chowrasee Bigahs.	Surhone Bigahs.	Soopa Bigahs.	Parchole Bigahs.	Chikalee Bigahs.	Bulhar Bigahs.	Total Bigahs.	Description of Produce.	Remarks.
Sugarcane	43	..	22	504	705	835	1,103	1,348	4,563	Sugarcane.	N. B.—To find acres, multiply bigahs by 587.
Cotton	8,936	29,364	3,992	2,472	2,948	2,390	16	..	50,018	Cotton.	
Rice	2,664	2,279	527	3,122	6,946	4,713	19,213	9,505	48,969	Rice.	
Jowarree	19,608	25,145	13,881	4,653	4,211	10,380	2,760	77	80,715	Jowarree.	
Bajaree	8,007	68	1,677	170	..	2	..	..	9,924	Bajaree.
Wheat	28,313	13,097	999	..	44	4	1	..	42,469	Wheat.	
Castor oil	7	222	..	31	674	85	8,077	2,607	11,703	Castor oil.	
Pulses	2,906	587	607	810	857	633	3,827	1,664	11,891	Pulses.	
Fallow	16,828	17,561	9,734	13,895	18,842	16,639	55,826	43,867	1,93,192	Fallow.	
Kodra .....	..	..	..	166	340	1,064	11,551	8,923	22,044	Kodra.
Miscellaneous ..	1,055	445	884	259	408	2,748	3,818	3,380	12,997	Miscellaneous.	
Total ..	88,267	88,768	32,323	26,093	35,975	39,496	1,06,192	71,371	4,98,485	Land taken up.	
Cultivable area	91,787	1,01,932	34,978	34,616	42,889	41,633	1,43,338	80,565	5,71,738	Cultivable area.	

**SELECTIONS FROM THE RECORDS OF THE BOMBAY
GOVERNMENT.**

No. LXII.—NEW SERIES.

PAPERS

RELATIVE TO THE INTRODUCTION

OF

REVISED RATES OF ASSESSMENT

INTO

THE MOORBAR TALOOKA

OF THE

TANNA COLLECTORATE.



Bombay:

PRINTED FOR GOVERNMENT

AT THE

EDUCATION SOCIETY'S PRESS, BYCULLA.

1861.

No. 561 of 1860.

*Tanna, Collector's Office, Goregaon;
30th March 1860.*

From J. R. MORGAN, Esq.,
Collector, Tanna,

To S. MANSFIELD, Esq.,
Revenue Commissioner, N. D.

SIR,—I have the honour to transmit the accompanying Report, No. 21, dated 13th January 1860, and statements in original, received from Captain Francis, Superintendent Revenue Survey, on the revised rates proposed to be introduced into the villages of the Morbar talooka of this zillah.

Diagram received on the 7th February. Further reply on the 19th March 1860.

2. This talooka is composed of 252 villages, of which 4 are Inam, 5 held on the Izafut tenure, and the remaining 243 are Khalsat, or villages under direct Government management, divided between a Mamlutdar and Mahalkurry, there being 155 under charge of the first, and 97 under that of the second named officer.

Captain Francis' paragraphs 2, 3, and 4.

3. The situation of the kutcheries and distribution of the villages between these officers, is reported by Captain Francis to be convenient for supervision.

4. The measurement and classification of the lands in this talooka was performed during the years 1857-58, 1858-59, and present season, by Messrs. Waddington and Hexton.

Paragraphs 5 and 28.

5. It will be perceived that there is very little difference between the rates at present levied and the rates proposed by Captain Francis, which are the same as those sanctioned for the Nusrapoor talooka. The reasons which have induced Captain Francis to propose these rates for the different groups of villages are fully explained in the paragraphs as per margin.

Paragraphs 6 to 10.

6. Captain Francis has explained that this report has only reference to the Mahalkurry's division of this talooka; that, in consequence of the classification of the lands in the Mamlutdar's division having extended into the present season, he has been unable to prepare the necessary statements to accompany this report, and therefore requested my sanction to introduce the rates into the whole talooka, upon the strength of the data supplied for the Petta.

7. As I approved of the rates proposed, and it would have delayed for another year the introduction of the revised rates into this talooka, had I waited for the statements for the Mamlutdar's division to be completed, and as Captain Francis requested permission to commence the settlement at an early period to enable him to proceed to the Rutnagherry zillah, to introduce the Revenue Survey system there; and as the results to be expected deducible from the data supplied, regarding the Mahalkurry's division, were, I considered, satisfactory, I authorized the settlement being made according to the revised rates, which will, I hope, meet with your approval and the sanction of Government.

8. I would beg to refer you to the correspondence commencing with Mr. Collector Giberne's letter of the 13th April 1837, and ending with Mr. Revenue Commissioner Williamson's letter, No. 2285, of 10th October 1838, relative to the revised rates introduced by Mr. Colcl's, and touched upon by Captain Francis in the 22nd and 23rd paragraphs.

9. The proposed assessment on present cultivation, compared with the average realizations for the last ten years and realizations for 1858-59, shows that, in rice land, there is the slight decrease of Rs. (221) two hundred and twenty-one as regards the first period, and of Rs. (1,270) one thousand two hundred and seventy as regards the second; the realizations for this year 1858-59, however, being the highest, with one exception, since we have had the district.

<i>Rice.</i>	
Average of 10 years	Rs. 45,136
Proposed rates on present cultivation	„ 44,915
Decrease....	Rs. 221
Realizations of 1858-59	Rs. 46,185
Proposed rates on present cultivation	„ 44,915
Decrease....	Rs. 1,270

Wurkus.

Average of 10 years	Rs. 5,901
Proposed rates	„ 6,776
Increase....	Rs. <u>875</u>
Realizations of 1858-59	Rs. 6,589
Proposed rates	„ 6,776
Increase....	Rs. <u>187</u>

10. Whilst on the wurkus cultivation there is an increase, both on the average realization of ten years and realization of 1858-59, as per margin.

11. The proposed rates on both descriptions of land, compared with ten years average and realizations of 1858-59, shows that, in the former case, there is an increase of Rs. (654) six hundred and fifty-four, and in the latter a decrease of Rs. (1,084) one thousand and eighty-four.	
Average realizations of 10 years on both descriptions of land	Rs. 51,037
Proposed rates on ditto.....	„ 51,691
Increase....	Rs. <u>654</u>
Realizations in 1858-59.....	Rs. 52,775
Proposed rates	„ 51,691
	Rs. <u>1,084</u>

12. Whilst the proposed rates on both the cultivated and waste land show an increase, as compared with ten years average, of Rs. (4,598) four thousand five hundred and ninety-eight, and with the realizations of 1858-59 of Rs. (2,860) two thousand eight hundred and sixty.	
Average realizations of 10 years ..	Rs. 51,037
Proposed rates on both the cultivated and waste lands	„ 55,635
	Rs. <u>4,598</u>
Realizations of 1858-59.....	Rs. 52,775
Proposed rates on cultivated and waste lands.....	„ 55,635
	Rs. <u>2,860</u>

13. I am unable, without more detailed information than I at present possess, to offer an opinion on the claim set up by the Panderpeshas of this talooka, to a lower rate of assessment, alluded to in the 26th and 27th paragraphs of Captain Francis' report.

I have the honour to be,

Sir,

Your most obedient Servant,

J. R. MORGAN,
Collector.

No. 21 OF 1860.

Superintendent's Office, Camp Bhewndy,
13th January 1860.

From Captain J. FRANCIS,
Superintendent Revenue Survey and Assessment,
To J. R. MORGAN, Esq.,
Collector of Tanna.

SIR,—I have the honour to submit a report on the rates that I propose to introduce into the villages of the Morbar talooka at the current year's revenue settlement.

2. Morbar contains 255 villages according to the present records of the district. Three of these, however, shown as "Shewsund," or boundary disputes, have now to be deducted from the above number, as the land concerned has been apportioned off, at the settlement of the dispute, to the village to which it was found to have originally belonged, thus leaving 252 as the total number of villages, according to the account prepared from the survey measurements.

3. Four of the latter are held in Inam and five* on the Isafut tenure, the remaining 243 being the regular Khalsat villages of the district. But as it has been recently decided, in the orders† issued on the Report upon the Callian talooka, that Isafut villages are to be brought under the survey rates, the five held on that tenure in this district will be included in my proposals, making, with the Government villages above mentioned, a total of 248 villages to be brought under the settlement.

* Dewpeh, Potgaon, Mhasla, Kotehghur, and Shereh.

† Government resolution, No. 2662, dated 9th July 1859.

4. Of the 252 villages above mentioned, 155 are attached to the Soobah or Mamlutdar's division, and 97 to the Mahalkurry's division of the talooka.

The town of Morbar, which is the head-quarter station of the district, is a good central spot for the chief kutcherry station, and is also an eligible situation for it, as being a healthy place in rather a feverish district. Kinowly, where the Mahalkurry is stationed, is also well suited for a kutcherry station, being pretty

much in the centre of the portion of the district attached to that division. The villages appear to have been originally allotted in a convenient manner for the supervision of both district officers, and the talooka, as a whole, comprises a compact piece of territory, judiciously arranged for revenue and police administration.

5. The measurement of the district was commenced in the season of 1856-57. Four establishments were employed that year and two in the succeeding one. Owing, however, to the feverish nature of the climate, the establishments were not moved into the district till the season was well advanced, so that the operation occupied only part of the two seasons referred to. The result of the test has already been exhibited in the returns submitted with the Annual Progress Report, from which I have extracted the summary of the result given in the statement appended.

6. Morbar is one of the most inland districts of the collectorate, and, with the exception, perhaps, of part of Kolwun, is more unfavourably situated with regard to natural facilities—for transporting its produce to the great markets on the coast—than any other district, the surface of a considerable part of it being too rough and undulating for cart traffic. Moreover, it is unfortunate in that nothing has been done by way of opening out communication with the coast, for to this present there is not a mile of made-road in the district. If, however, the projected road from Jooneer down the Malsez ghaut to Callian be constructed, it will pass through the centre of Morbar, and be of great advantage to it; but I am afraid the expense of this work is too great when considered with reference to the comparatively small tract of country that would thereby be brought in communication with the Railway, and with water carriage at Callian.

7. The latter town—distant about 15 miles from the confines of Morbar—is the great market to which almost all the rice of the district is carried. Carts are used for its transport for a distance of 7 or 8 miles inland beyond the town of Morbar; but the road is very rough and circuitous. There is also another cart-track through the northern part of the district to Wassind; but by far the larger portion of the rice is taken to market on pack bullocks.

8. In no district to which the settlement has as yet been extended, have I found the people so entirely dependent upon the cultivation of the soil for their support as those of Morbar, almost the whole

population being engaged in agricultural pursuits. The inhabitants of the coast districts, for instance, can and do add materially to their means of support by the profits from fishing and from the production of salt, and they have also an extensive field for labour near at hand in Bombay. The Morbar • ryot, however, has no such extraneous means of contributing to his support, unless he leave his village for employment on the Railway or Public Works; and that kind of work is not generally popular amongst the cultivators of this district. The want of trade and manufactures is a great drawback, as it leaves the inhabitants so entirely dependent upon agricultural resources. But some good comes out of this want of other employment: for there is no doubt that the time that would have been thus spent is devoted to labour in the field, and, as a consequence, we see the land more carefully tilled than elsewhere; and I can speak from personal observation that such is really the case.

9. Notwithstanding the disadvantages above described, the people are pretty well off; and considering the circumstance that but few of them have any other resource to trust to but their fields, such a state of things indicates that the present assessment must, on the whole, be favourable, and such, it will be seen, is the opinion I have formed of it.

10. Morbar is surrounded, for the most part, by districts to which the settlement has already been extended. It adjoins Nusrapoor on the south, and Callian on the west; whilst it is separated from the Poona zillah by the Syhadree ghauts on the east,—Kolwun talooka on the north being the only unsurveyed district touching its boundaries. It has a great similarity to Nusrapoor, in regard to distance from markets; and in climate and general productiveness there is no appreciable difference between them. Nusrapoor is certainly better circumstanced with regard to means of communication. The Railway however, which passes through it, was not in existence when the rates were introduced; and though the line was sanctioned at that time, and under construction too, the Railway was not taken into consideration as a means of improving the resources of the district: consequently, for a comparison with Morbar, we must take the state of Nusrapoor before the Railway was opened, and at that time it had the branch road from Chowk to Callian as the means of transporting its produce to the latter market in one direction, and that from Chowk to Panwell to the market at the latter place in the other:

Morbar, as before mentioned, has no made-road of any kind; but the western parts of it are a few miles nearer to market* than any part of Nusrapoor, which may be taken as a set-off against the advantage the latter has in point of roads..

* Callian.

11. Such being the similarity in the circumstances of the two districts, I propose to place them upon an equality in regard to assessment, by extending the Nusrapoor rates to Morbar. The maximum rate was Rs. 4-8-0 in the former case, exclusive of the addition made on account of the wurkus lands, whose assessment, as you are aware, was incorporated with the rice. Starting with this for the best villages, I have divided the district altogether into five different groups, with the following rate for each, viz:—

				Rs.	a.	p.
1st group of 67 villages, for which the rate is.....				4	8	0
2nd ditto 115	ditto	ditto		4	0	0
3rd ditto 15	ditto	ditto		3	8	0
4th ditto 15	ditto	ditto		3	0	0
5th { ditto 21	ditto	ditto		2	8	0
{ ditto 14	ditto	ditto		2	0	0

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12. With regard to the manner in which the villages have been divided into classes, and the reasons for the reduction made in the rates in each case—The first group comprises most of the villages on the western side of the district adjoining the Callian talooka, the line being carried inland, so as to include those a few miles beyond the town of Morbar—situated in the rather open plain there is in the centre of the district,—and then taken across to the northern side so as to include those bordering on Wassind. All the villages in this class have a cart-road to Callian or to the Railway Station at Wassind.

13. The second group comprises a string of villages immediately east of the former, and includes also a few bordering on the Callian talooka, omitted from class 1 on account of their being rather jungly and somewhat inaccessible, which, taken together with the fact of

* Add Goruckghur, omitted from the statement on account of its not having any rice land, which makes the total of 248 villages to be assessed, as per paragraph 2.

their being generally further distant from market and mostly inaccessible for cart traffic, is the reason why a reduction of 8 annas on the former rate has been made in this case.

14. Class three, rated at Rs. 3-8-0, comprises the villages for the most part east of the preceding group, but generally further distant from market.

15. Class four, having a 3 rupee rate, comprises those adjoining the Ghauts on the side bordering on the Nusrapoor talooka, including also some of the villages belonging to the Mahalkurry's division, a little distance from the Ghauts, but difficult of access. The rate is the same that was applied to the part of Nusrapoor here alluded to at the settlement of that district.

16. With regard to class five, it includes the most jungly villages of the district, for which I have fixed the rate of Rs. 2-8-0 and Rs. 2. The low rate of Rs. 2, adopted in this case, is made specially to suit the circumstances of a few villages mostly situated in the north-eastern corner of the district, bordering on the Kolwun talooka. They are in a very out-of-the-way place, being in the rough country contiguous to the Ghauts in this locality, and are, moreover, inhabited almost entirely by Colies. They require a favourable settlement, as they have been much harassed of late years by the different "Bunds" that have disturbed the Ghaut country. Some of them were looted by Raghojee Bangria, and some are not far from the scene of Raghojee Naik's last descent into the Concan,—it being on the occasion of his return from this excursion to some of his haunts in the Deccan, that he and his whole party were surprised and entirely cut up in the recent gallant affair with the Nugger Police, commanded by the Superintendent, Mr. Souter.

17. Considering these circumstances, there is no doubt these villages need some nursing to enable the cultivators to acquire the means of extending their cultivation; and a low rate is, moreover,

advisable as an inducement to this class* of
 * Colies.
 people to settle down into quiet habits. Upon these grounds, then, I trust you will support my recommendation for the low rate proposed for these villages.

18. The wurkus lands of this district are valuable for cultivation only: for the grass they produce has no saleable value in the district, and the markets of the coast are too distant to admit of its transport

to them with profit. It is used entirely for "Rab;" but, though turned to a good account in that way, it yields no direct return to the cultivator. In consideration, therefore, of this part of the produce of these lands being of such little value, I propose to have a rate of three annas per acre, instead of four, which has, for the most part, been the standard rate of assessment for such lands throughout the part of the collectorate already settled. There are, however, some few villages in which the lands are particularly good for wurkus crops, and some few on the borders of Callian talooka, which might carry their grass to the markets of that district. For these two classes of villages I have adopted a four-anna rate; but by far the greatest part of the district will be brought under the three-anna one.

19. There is but a very small extent indeed of rubbee in the district, the revenue from that cultivation last year being only Rs. 19: what little land there is will be assessed at the usual $1\frac{1}{2}$ Rupee rate. There is no baghaet whatever.

20. Owing to a considerable part of the Mamlutdar's division not having been classified until the current season, work having been in progress till the end of the past month, I am unable to furnish a statement showing the result of the proposed rates for the villages of that division; but as all those under the Mahalkurry's charge were classified before the past monsoon, statements for the same have been prepared in the usual way, and the result in that case may be safely taken as the indication of the effect of the same rates in the Mamlutdar's division. That such will be the case, I have ascertained by applying the different classes of rates to several villages of the latter division that were classified last year, and I can, therefore, speak with considerable confidence upon this point. The result will, however, be submitted in detail after the introduction of the settlement; but meanwhile I have to solicit permission to introduce the rates upon the strength of the data supplied for the Mahalkurry's division only.

21. It will be seen from the diagram annexed, which includes the Mahalkurry's division only, that the revenue has been steadily increasing for the last 10 or 15 years, whilst remissions have almost entirely disappeared from the accounts,—Rs. 103 being the amount of them last year, and Rs. 63 the year before. The diagram exhibits the result of our revenue management for 26 years. For the four first years of this period, the original rates that were in operation

when the district was ceded were in force; but that they were too high for the resources of the agricultural classes at that period, may be inferred from the large remissions that were needed at that time. In one year (1835-36) the large sum of Rs. 11,390 was remitted out of a jumabundy of about Rs. 42,390, the collections that year being a little less than Rs. 31,000, whereas for the last two or three years they have amounted to about Rs. 53,000.

22. The impaired state of the resources of the agricultural classes at the period referred to, and the large outstanding balances which, in April 1836, are stated to have been Rs. 40,000 for the whole district, having been brought to the notice of Government, Mr. George Coles, then Assistant to the Collector, was entrusted with the duty of revising the assessment of the district; and, judging from the sequel, he appears to have made a judicious settlement, as a steady and continued increase in the revenue has followed upon his revision. We learn from his report that the district was assessed during the Peishwa's government, in 1788-89, by Sudasew Kaishew, at rates of Rs. 5-5-0, Rs. 4-4-0, and Rs. 3-3-0 per beegah, fixed with reference to the quality of the land; but that, on its being let out in farm, the Khotas raised the assessment to a uniform rate of Rs. 5-8-0, which obtained at the time his revision was made.

23. Classing the district according to the old Mahal divisions, he reduced the rates in five from Rs. 5-8-0 to Rs. 4-4-0, and in a few cases to Rs. 4 and Rs. 3-12-0. In the other three Mahals, being those towards the Ghauts, his rates were Rs. 3, Rs. 2½, Rs. 2, and in a few cases as low as Rs. 1½ per beegah. The first settlement according to these rates was made in 1837-38, and on referring to the diagram of that year, you will observe that the reduction made amounted to about Rs. 6,700, as shown by the difference in the jumabundy of that and the preceding year.*

*1836-37.. Rs. 41,700

1837-38.. „ 34,940

Rs. 6,760

Some allowance should be made for the increase in cultivation in the latter year, equal to an extent of about 300 beegahs, which, at a four-rupee rate throughout, would give about

Rs. 1,200 as due to this cause, leaving the reduction at about Rs. 5,000. The first year after the reduced rates were introduced would appear to have been a bad season, as about Rs. 2,500 were given in remissions; but the cultivators seem to have soon recovered

under the liberal assessment fixed by this officer, which, aided by the great increase in the price of grain of all sorts that has since taken place, has effected a marked improvement in their condition.

24. With the people generally well off—as they certainly are now,—the price of grain yearly going up, the revenue also yearly increasing and yet paid with facility, this evidently is not a district that requires any reduction of assessment; and I am glad to be able to state that the rates proposed, being those which it should bear with reference to the rates of the other settled districts of the zillah, will not effect any perceptible reduction, as will be seen from the statement given in the following paragraph.

25. Referring, in the first instance, to the present assessment, I find that our collections in this division alone have been as follows, viz :-

	Rice.	Wurkus.	Total.
	Rs.	Rs.	Rs.
Annual amount deducted from the last ten years' realizations	45,136	5,901	51,037
Realizations in 1858-59	46,185	6,589	52,775

And the following* will be the assessment resulting from proposed rates, viz :—

	Rice.	Wurkus.	Total.
	Rs.	Rs.	Rs.
On present cultivation	44,915	6,776	51,691
On waste	2,611	1,333	3,944
Total ... Rs.			55,635

From this it will be seen that the new assessment taken on the present cultivation only slightly exceeds the average collections of the past ten years, but is about Rs. 1,000 less than those of 1858-59,* which, with one exception, exceed the realizations of any other year since the district has been under our charge. The value of the waste being just Rs. 4,000, the new

* Collections of
1858-59 Rs. 52,775
Survey assessment
on the same extent. „ 51,691
Rs. 1,084

kumal will be about Rs. 3,000 in excess of last year's revenue, being therefore equal to an increase of six per cent. thereon. But, besides the fixed assessment above given, some additional revenue will be realized from dullee cultivation and from the tracts set apart for sale as grazing lands, the value of these sources not being included in the above account, as no assessment has been placed upon the lands set apart for these purposes. I should consider, therefore, that we may fairly estimate that the district, under the survey settlement, will pay between four and five per cent. more revenue than has hitherto been collected. This is only a small increase certainly, but considering the little that has been done for the district by way of opening out its resources, and its naturally unfavourable position, it is fully as much as could be expected under such circumstances.

26. With regard to the Panderpeshas of this district, they have recently petitioned for a continuance of the privilege of a lower rate for their class under the revised settlement, and have also, I find from a reference from your office, sent you a petition to the same effect. The parties claiming the privilege are, for the most part, the Deshmooks and Deshpandyas of the district, who are of the Maratha caste. On referring to Mr. Coles' Report for information as to what was done in regard to this class at his revision, I find the following remarks on the subject:—"The Panderpeshas' present rate I recommend should be reduced, in these five mahals, from Rs. 4-4-0 to Rs. 3-8-0, on the principle of justice to all parties, which Mr. Davies recommends." The Collector, Mr. Giberne, in handing on the Report, states as follows in reference to this part of Mr. Coles' proposals:—"The Panderpeshas' rates in the five mahals, Mr. Coles proposes to reduce from Rs. 4-4-0 per beegah to Rs. 3-8-0, and the Thakoors and Khatkurries from Rs. 3-3-0 to Rs. 3, which I beg to recommend on the principles recommended and adopted in the adjoining talooka of Nusrapoor." No allusion is specially made to the subject in the Government reply to the Report; but, as a general sanction is given to the proposals therein made, the privilege of a lower rate would appear to have been conceded at that time.

27. I am doubtful however, from what I have seen of the present revenue papers, whether any record of the Panderpesha land is forthcoming. I shall have an opportunity of carefully examining

the records at the time of introducing the settlement, and after that shall be in a position to give more specific information upon this point. Supposing, however, that such a record is forthcoming, I shall, in such case, carry out the form of settlement for Panderpeshas suggested in Government resolution No. 476, dated the 5th February 1859, which provides for the levy of their present rate on all the land brought to account in the survey measurement. But further inquiry, I trust, will enable me to submit more definite information upon this point; meanwhile, only their present payments will be levied this season, any increase thereon being given as remission, in the same way as such increases are treated when they occur in the holdings of ordinary ryots.

28. Owing to part of the district not having been classified, as before mentioned, till this season, a statement of the total area of the district has not been prepared. I am consequently unable to submit the usual information on this subject; and for the same reason, the classification test statements have not been completed. I can, however, state with confidence, from an examination of the rough returns sent me, that the classification has been carefully done by Messrs. Waddington and Hexton, part of whose work was examined by myself last season.

29. I have prepared a statement, hereto annexed, showing the rice and wurkus rates proposed for all the villages of the Mamlutdar's division, and their assessment will be calculated accordingly. But the result of these rates will not, as explained in paragraph 20, be submitted till after the introduction of the settlement.

I have the honour to be,

Sir,

Your most obedient Servant,

J. FRANCIS, Captain,

Supt. Revenue Survey and Assessment, Tanna.

STATEMENT exhibiting the Rates proposed for the Villages of
the Mamlutdar's Division.

Number.	Names of Villages.						Proposed Rates.		Remarks.
							Rice.	Warkua.	
							Rs. a.	Annas.	
1	Mohoghur	..	..	..	..	..	4 0	4	
2	Patgaon ..	..	..	..	..	..	4 0	4	
3	Kachkolee	..	..	..	..	..	4 8	4	
4	Thoudlee ..	..	..	..	..	..	4 8	4	
5	Sasueh ..	..	..	..	..	..	4 8	3	
6	Naweh, Khoord ..	..	..	..	..	..	4 8	3	
7	Borewlee ..	..	..	..	..	..	4 8	3	
8	Kanoleh ..	..	..	..	..	..	4 8	3	
9	Musch ..	..	..	..	..	..	4 8	3	
10	Cherut ..	..	..	..	..	..	4 8	3	
11	Amubtambeh	..	..	..	..	..	4 8	3	
12	Agasee ..	..	..	..	..	..	4 0	3	
13	Doughurnaweh	..	..	..	..	..	4 0	3	
14	Jamboordeh	..	..	..	..	..	4 8	3	
15	Kanewrch	..	..	..	..	..	4 0	3	
16	Gowehlee ..	..	..	..	..	..	4 0	3	
17	Ambehgaon	..	..	..	..	..	4 8	3	
18	Gagoorlee	..	..	..	..	..	4 0	3	
19	Bandewlee	..	..	..	..	..	4 0	3	
20	Sakoorlee ..	..	..	..	..	..	4 0	3	
21	Narewlee ..	..	..	..	..	..	4 0	3	
22	Ghera Killeh, Singhur	..	..	..	..	..	3 0	3	
23	Oochaleh ..	..	..	..	..	..	4 0	3	
24	Tullehkul	..	..	..	..	..	4 0	3	
25	Kapolee ..	..	..	..	..	..	4 0	3	
26	Killeh, Gorukghur	..	..	..	..	..	..	3	
27	Kulumbeh	..	..	..	..	..	4 0	3	
28	Toolaie ..	..	..	..	..	..	4 0	3	
29	Kulumbhar	..	..	..	..	..	4 0	3	
30	Kanarleh ..	..	..	..	..	..	4 0	3	
31	Valeh ..	..	..	..	..	..	4 0	3	
32	Dhareh ..	..	..	..	..	..	4 0	3	
33	Marus ..	..	..	..	..	..	4 0	3	
34	Kemdoorlee	..	..	..	..	..	4 8	3	
35	Raweh ..	..	..	..	..	..	4 0	3	
36	Jamghur ..	..	..	..	..	..	4 0	3	
37	Kondaleh ..	..	..	..	..	..	4 8	3	
38	Khandareh	..	..	..	..	..	4 0	3	
39	Sewleh ..	..	..	..	..	..	4 8	3	
40	Aubleh, Boodrook	..	..	..	..	..	4 8	4	

Number.	Names of Villages.	Proposed Rates.		Remarks.
		Rice.	Warkus.	
		Rs. a.	Annas.	
41	Danokee	4 8	4	
42	Mallar	4 8	4	
43	Puwaleh	4 8	4	
44	Baloom	4 0	3	
45	Koltun	4 0	3	
46	Manewlee, Boodrook	4 0	3	
47	Kandup	4 0	3	
48	Wudowlee	4 0	3	
49	Badaneh	4 0	3	
50	Kasgaon	4 0	3	
51	Kootul	4 0	3	
52	Nandgaon	4 0	3	
53	Surulgaon	4 0	3	
54	Mohopeh.. .. .	4 0	3	
55	Nagaon	4 0	3	
56	Dhywulee	4 0	3	
57	Majgaon	4 0	3	
58	Manewlee, Khoord	4 0	3	
59	Tooneh	4 0	3	
60	Tulowlee	4 0	3	
61	Purur	4 0	3	
62	Kandlee	4 0	3	
63	Ojewleh	4 0	3	
64	Anbleh, Khoord	4 0	3	
65	Sakreh	4 0	3	
66	Kissul	4 0	3	
67	Kurchondeh	4 0	4	
68	Walewreh	2 0	3	
69	Merdee	2 0	3	
70	Sawurneh	2 0	3	
71	Phangulehguwan	2 0	3	
72	Baradeh	2 0	3	
73	Jarghur	2 8	3	
74	Neyadee	2 0	3	
75	Moiasee	2 0	3	
76	Tulowlee	3 0	3	
77	Kootul	2 8	3	
78	Pagneh	2 8	3	
79	Wyshakureh	3 0	3	
80	Dewanparreh	2 0	3	
81	Oodaldoho	2 0	3	
82	Tethbee	2 0	3	
83	Heraghur.. .. .	4 0	4	
84	Asoseh	4 8	4	
85	Kurowleh.. .. .	4 8	4	
86	Wudoo	4 8	4	
87	Chickleh	4 8	4	

Number.	Names of Villages.						Proposed Rates.		Remarks.
							Rice.	Wurkus.	
							Rs. a.	Annas.	
88	Wagewlee	..	..	..	..	..	4 8	4	
89	Usoleh ..	..	..	..	..	..	4 8	4	
90	Wajleh ..	..	..	..	..	..	4 8	4	
91	Kelar ..	..	..	..	..	..	4 8	4	
92	Goraleh ..	..	..	..	..	..	4 8	4	
93	Noudenee.	..	..	..	..	..	4 8	4	
94	Pushanee.	..	..	..	..	..	4 8	4	
95	Kalehwurkul	..	..	..	..	..	4 0	4	
96	Phunsolee	..	..	..	..	..	4 8	4	
97	Tembreh, Khoord	..	..	..	..	..	4 0	4	
98	Mandweh .	..	..	..	..	..	4 0	4	
99	Seelund ..	..	..	..	..	..	4 0	3	
100	Kamghur..	..	..	..	..	..	4 0	3	
101	Berwarree	..	..	..	..	..	4 0	3	
102	Tulleh ..	..	..	..	..	..	4 0	3	
103	Pulluskul..	..	..	..	..	..	4 8	4	
104	Manewlee	..	..	..	..	..	4 0	3	
105	Sewlee ..	..	..	..	..	..	4 8	3	
106	Veereh ..	..	..	..	..	..	4 8	3	
107	Sajaie ..	..	..	..	..	..	4 8	4	
108	Morbar ..	..	..	..	..	..	4 8	4	
109	Tembreh, Boodrook	..	..	..	..	..	4 8	4	
110	Koorsait ..	..	..	..	..	..	4 8	4	
111	Dhanewlee	..	..	..	..	..	4 8	4	
112	Brawungaon	..	..	..	..	..	4 8	4	
113	Seergaon ..	..	..	..	..	..	4 8	4	
114	Tembgaon	..	..	..	..	..	4 8	4	
115	Moraie ..	..	..	..	..	..	4 8	4	
116	Juraie ..	..	..	..	..	..	4 8	3	
117	Kotehghur	..	..	..	..	..	4 8	3	
118	Boowun ..	..	..	..	..	..	4 8	3	
119	Kullumkund	..	..	..	..	..	4 8	3	
120	Duhegaon	..	..	..	..	..	4 8	3	
121	Sadolee ..	..	..	..	..	..	4 0	3	
122	Patgaon (Isafut)..	..	..	..	..	..	4 0	3	
123	Masleh (Isafut) ..	..	..	..	..	..	4 0	3	
124	Dewpeh (Isafut) ..	..	..	..	..	..	4 8	4	
125	Mur ..	..	..	..	..	..	3 0	4	
126	Kullumbhar	..	..	..	..	..	3 0	3	
127	Mahaj ..	..	..	..	..	..	3 8	3	
128	Kawareh ..	..	..	..	..	..	3 0	3	
129	Naiegaon..	..	..	..	..	..	3 0	3	
130	Oombrolee, Khoord	..	..	..	..	..	2 8	3	
131	Doodnolee	..	..	..	..	..	3 8	3	
132	Kalosee ..	..	..	..	..	..	3 8	3	
133	Padeh ..	..	..	..	..	..	3 0	3	
134	Hind ..	..	..	..	..	..	3 8	3	

Number.	Names of Villages.	Proposed Rates.		Remarks.
		Rice.	Wurkus.	
		Rs. a.	Annas.	
135	Kuduleh	4 0	3	
136	Ulleanee	3 8	3	
137	Pimpulghur	3 8	3	
138	Dusaie	4 0	3	
139	Deoghur	3 0	3	
140	Mandwut.. .. .	3 8	3	
141	Chou	3 8	3	
142	Yeklureh.. .. .	3 0	3	
143	Duhegaon	3 0	3	
144	Pendree	2 8	3	
145	Puloo	3 0	3	
146	Sonowleh.. .. .	3 0	3	
147	Syleseelghur	4 0	3	
148	Oombrolee, Boodrook	3 8	3	
149	Bulehgaon	3 8	3	
150	Kapree	2 8	3	
151	Manewlee.. .. .	3 0	3	
152	Tokowdeh	3 8	3	
153	Adowlee	2 8	3	
154	Koorshait	2 8	3	

J. FRANCIS, Captain,
Supt. Revenue Survey and Assessment, Tanna.

Measurement Test Statement.

Name of Talooka.	Years.	No. of Fields tested.	Fields in which the percentage error was within—										Errors above 10 per cent.
			1	2	3	4	5	6	7	8	9	10	
Morbar	1856-57	1,455	723	361	153	92	46	24	12	18	8	6	12
	1857-58	1,291	639	276	175	90	42	18	16	11	7	9	8

J. FRANCIS, Captain,
Supt. Revenue Survey and Assessment, Tanna.

25	Vailowlee, Khoord....	460	463	48	511	4	0	440	51	491	7	..	640	2,473	38,206
26	Khurwlee	500	494	32	526	4	0	434	27	461	90	13			
27	Wachkoleh	177	186	14	200	4	0	173	26	199	20	..			
28	Churwlee	488	491	31	522	4	0	492	54	546	3	6			
29	Seerwunj	241	245	16	261	4	0	245	31	276	120	44			
30	Behlowlee	92	94	4	98	4	0	86	7	93	8	..			
31	Dussaie	1,370	1,446	110	1,556	4	0	1,344	95	1,439	79	7			1,525
32	Sathgaon	642	669	48	717	4	0	642	117	759	9	10			778
33	Mullengaon	1,106	1,162	73	1,235	4	0	1,153	148	1,301	8	7			1,316
34	Bareigaon	428	450	36	486	4	0	408	120	528	23	2			553
35	Shelotur	431	470	72	542	4	0	464	33	497	52	62			611
36	Kasgaon	337	384	44	428	4	0	402	69	471	26	..			497
37	Mongkon	1,049	1,075	111	1,186	4	0	1,040	110	1,150	51	14			1,215
38	Omrata	920	949	47	996	4	0	874	72	946	12	1			959
39	Purtolee	281	307	27	334	4	0	263	42	305	24	..			329
40	Ttoneh	1,117	1,127	124	1,251	4	0	1,053	123	1,176	14	34			1,224
41	Lowleh	737	754	79	833	4	0	617	59	676	19	..			695
42	Kanweh	650	687	53	740	4	0	598	118	716	18	2			736
43	Phopowree	307	320	32	352	4	0	274	43	317	9	..			326
44	Vehlowlee, Boodrook..	1,147	1,183	333	1516	4	0	1,207	189	1,396	75	220			1,691
45	Moosale	574	599	123	722	4	0	556	94	650	8	9			667
46	Shehmveh	612	624	30	654	4	0	536	42	578	45	..			623
47	Koolah	299	294	25	319	4	0	252	31	283	9	..			292
48	Charowlee	514	541	88	629	4	0	533	58	591	16	2			609
49	Soho	1,088	1,133	138	1271	4	0	998	162	1,160	13	..			1,173
50	Nandgaon	235	240	12	252	4	0	209	19	228	11	..			239
51	Kanchree	374	419	81	500	4	0	412	92	504	18	13			535
52	Sawrolee	597	656	254	910	4	0	638	125	763	31	34			828
53	Pulsalee	270	283	40	323	4	0	256	63	319	36	2			357
54	Nurgaon	354	375	32	407	4	0	308	28	336	26	35			397
55	Kochreh, Khoord....	157	176	34	210	4	0	138	23	161	3	3			167
56	Ambewlee	80	91	35	126	4	0	89	38	127	1	..			128
57	Ashteh	255	264	42	306	4	0	248	44	292	7	..			299
Carried over....		32,057	52,789	3,974	36,763	..		17,382	4,320	35,733	1,833	640	2,473		38,206

Number.	Names of Villages.	Payments under present Settlement.			Assessment according to proposed Survey Rates.										Total Cultivation and Waste.
		Taken on the average for 10 years.	According to Jumamahundy of 1858-59.		Rate.	On the Cultivation of 1858-59.				On Waste Lands.					
			Rice.	Wurkus.		Total.	Rice.	Wurkus.	Total.	Rice.	Wurkus.	Total.			
Rs.	Rs.	Rs.	Rs.	Rs. a.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
	Brought over....	32,057	52,789	3,974	36,763	..	17,382	4,320	35,733	1,833	640	2,473	38,206		
58	Andewlee	324	349	68	416	4 0	314	46	360	23	15	38	398		
59	Dhywlee	227	241	17	258	4 0	216	32	248	10	11	21	269		
60	Khurur	560	585	51	636	4 0	556	86	642	19	..	19	661		
61	Ambhurjeh	779	802	49	851	4 0	832	57	889	21	16	37	926		
62	Heweh	362	376	116	492	4 0	427	79	506	20	21	41	547		
63	Shelwlee	570	586	30	616	4 0	607	40	647	22	..	22	669		
64	Undar.....	311	283	33	316	4 0	308	32	340	24	..	24	364		
65	Ulleance	1,287	1,260	114	1,374	4 0	1,361	167	1,528	70	7	77	1,605		
66	Tulleh	285	255	40	295	4 0	274	27	301	125	15	140	441		
67	Nehrolee.....	490	459	111	570	4 0	484	48	532	39	49	88	620		
68	Sergaon	427	443	72	515	4 0	458	74	532	42	28	70	602		
69	Nurgaon	1168	1,193	172	1,365	4 0	1,113	117	1,230	39	14	53	1,283		
70	Sapgaon.....	465	467	32	499	4 0	445	61	506	11	..	11	517		
71	Ghosia	61	62	2	64	4 0	74	..	74	3	6	9	83		
72	Kutehghur (Isafut) ..	360	306	61	367	4 0	526	54	580	11	24	35	615		
73	Khyreh	259	269	52	321	3 8	234	73	307	21	4	25	332		
74	Sarungpooree	470	481	131	612	3 8	438	62	500	69	128	197	697		
75	Malkhind	375	381	65	446	3 8	319	45	364	7	10	17	381		
76	Apteh	750	772	245	1,017	3 8	734	56	790	11	81	92	882		
77	Kochreh, Boodrook ..	86	103	76	179	3 0	85	23	108	27	43	70	178		
78	Koodshait	41	47	21	68	2 8	34	1	35	3	12	15	50		
79	Ambehkoor	63	68	186	254	2 8	67	119	186	10	34	44	230		
80	Vailkoom	229	237	15	252	2 8	233	63	296	9	8	17	313		
81	Khair	162	166	7	173	2 8	174	59	233	9	5	14	247		
82	Shelgaon	336	363	7	370	2 8	367	59	426	6	..	6	432		

83	Wunatch	87	87	6	93	2	8	90	29	119	2	2	4	123
84	Shaie	96	103	11	114	2	8	104	22	126	3	..	3	129
85	Behlowlee	149	154	18	172	2	8	148	23	171	1	..	1	172
86	Sheroshee	336	339	62	401	2	8	384	123	507	9	..	9	516
87	Mal	298	324	475	799	2	8	341	241	582	35	114	149	731
88	Ambewlee	111	114	13	127	2	8	124	56	180	..	..	..	180
89	Juraie	267	279	37	316	2	8	295	118	413	11	1	12	425
90	Tullehgaon	859	871	95	966	2	8	786	264	1,050	51	..	51	1,101
91	Allow	178	187	7	194	2	0	165	36	261	..	..	..	201
92	Chasoleh	254	263	77	340	2	0	239	43	282	5	24	29	311
93	Degehphul	8	10	9	19	2	0	10	9	19	1	..	1	20
94	Phangloshee	89	112	33	145	2	0	136	12	148	9	21	30	178
Total....		45,236	46,185	6,590	52,775	..	..	44,915	6,776	51,691	2,611	1,333	3,944	55,635

No. 2189 OF 1860.

Tanna, Collector's Office,
16th November 1860.

From J. R. MORGAN, Esq.,
Collector of Tanna,

To S. MANSFIELD, Esq.,
Revenue Commissioner, N. D.

SIR,—With reference to my letter No. 561, of the 30th of March last, forwarding Report from Captain Francis, Superintendent of Revenue Survey, regarding rates proposed for the Mahalkurry's division of the Morbar talooka of this zillah, I have the honour to transmit a further report from this officer concerning the Mamlutdar's division of the same talooka.

2. Having approved of the rates proposed, as explained in the 7th paragraph of my letter above quoted, I authorised, pending the Government sanction, the introduction of the rates during the year; and as the subject has been so fully entered into by Captain Francis in his first letter, I do not appear called upon to offer any remarks on the rates proposed in the present report.

3. The following table shows at a glance the revenue settlement, according to the new rates, compared with the average amount of revenue realised during the past ten years :—

	Ten years' averages.			Jummabundy for 1859-60.		
				According to Survey Rates.		
	Rice.	Wurkus.	Total.	Rice.	Wurkus.	Total.
<i>Pragraph 2.</i>	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Mamlutdar's division	67,480	9,726	77,206	68,018	9,215	77,233
Mahalkurry's division	45,136	5,901	51,037	45,332	6,615	51,947
			1,28,243			1,29,180

4. It will be thus seen that the settlement of 1859-60, according to survey rates, is within a few hundred rupees of the average realizations during the last ten years. If to this is added the revenue derivable from the waste land, viz :—

For Mamlutdar's division	Rs. 6,237
For Mahalkurry's division	„ 3,564
	<u>Rs. 9,801</u>

the total realizable revenue for the entire talooka will be Rs. 1,38,981, or above Rs. 10,000 more than the average realizations of the past ten years.

5. The settlement may be considered satisfactory; and as we have hitherto found in nearly all the districts in the Concan into which the survey rates have been as yet introduced the waste lands sought for, we may expect to find the waste lands in these districts gradually taken up.

6. The subject of the one-anna extra rate for general improvement, to which allusion is made in the 5th paragraph of Captain Francis' report, having been disposed of by the Government resolution, as per margin, received with your memorandum No. 2266 of 10th idem, no further measures are necessary.

No. 3567, of 6th October last.

7. I do not agree with the views expressed by Captain Francis in the 6th and six following paragraphs relative to the Enam lands claimed by certain parties in the Jureeshirooshee turf. If the claimants have any proof of their right to enjoy a larger quantity of land than they now hold, their claims should most undoubtedly be attended to; but I do not think that Government can be justly called upon to give up a large extent of land merely because the parties concerned are dissatisfied with the settlement, which appears to me to have been justly made.

8. It would appear that the wurkus land under cultivation at the time of Mr. Coles' survey was measured, and allowed to be held rent-free; and since this all wurkus land brought under cultivation during the year in excess of Mr. Coles' measurement has been assessed.

9. Should the Enamdars have been entitled to a larger quantity of land than allowed at Mr. Coles' survey, they would surely have

claimed it at the time; not having done so, and having paid rent for all land in excess of Mr. Coles' measurement, it may, I think, be presumed that the claim now set forth is groundless.

10. Captain Francis has not explained how he obtained the result shown in the statement in paragraph 10, or on what grounds he considers the Enamdars entitled to a larger extent of land rent-free than that at present enjoyed.

11. Government may, however, be induced, under the peculiar circumstances of the case, to deal with these land-holders as suggested by the Superintendent; and as the summary settlement will probably be shortly introduced into these districts, Captain Francis' suggestion of allowing the extra land alluded to in the 10th paragraph might be sanctioned, pending final settlement of the question. Should this be permitted for the Jureeshirooshee turf, I beg to suggest that Captain Francis be authorised to make the same arrangement for the two turufs referred to in the 12th paragraph of his report.

12. With reference to the 13th and the following paragraphs, in which the rights of Izafutdars and their ryots are discussed, and the latter part of the 17th paragraph, I would beg to observe that Government having decided, by resolution No. 2662 of the 9th July 1859, that the full survey rental should be exacted from the holders of the Izafut villages in the Panwell talooka, the Izafutdars of the Morbar talooka should, I am of opinion, be required to pay the survey rental of their villages.

13. The rights of the ryots in these villages, or any general question in regard to the Izafut villages throughout the Concan, might, I am of opinion, be more conveniently discussed distinctly; and Captain Francis, who appears to have deferred the introduction of the survey rates into the Panwell villages, might be required to explain fully the causes that have delayed the measure sanctioned by Government, and to submit, in a separate letter, any propositions he may have to offer in respect to Izafut villages generally.

14. Before concluding my letter, I beg to refer you to the correspondence ending with letters, as per margin, relative to the revision of assessment by Mr. Coles in the Morbar talooka, and the payment of a sum of money from the Treasury on account of

No. 1139 of 21st July 1837,
from Revenue Commissioner to
Collector. Memorandum No.
438 of the 6th March 1849,
from Revenue Commissioner
to Collector.

Lagima hucks, levied direct from Ryots by the Zemindars, and which were, at Mr. Coles' settlement in 1837, consolidated in the revised assessment.

15. I beg to apologise for the delay that has occurred in forwarding on Captain Francis' Report, and to explain that, shortly after receiving it in July last, I was taken so unwell as to be unable to take up any work, and the Report has thus laid over till my return from leave on the 1st instant.

I have the honour to be,

Sir,

Your most obedient Servant,

J. R. MORGAN,
Collector.

3 Copies for the Mahalkurry's division.
3 Copies for the Mamlutdar's division.
3 Copies for the entire Talooka.

P. S.—I beg to transmit the diagrams, as per margin, regarding the Morbar talooka.

J. R. MORGAN,
Collector.

No. 324 OF 1860.

*Superintendent's Office, Poona,
2nd July 1860.*

From Captain J. FRANCIS,
Supt. Revenue Survey and Assessment, Tanna.

To J. R. MORGAN, Esq.,
Collector of Tanna.

SIR,—With reference to the remarks in paragraph 20 of my Report on the revision of the Assessment of the Morbar talooka, I have now the honour to submit the information therein promised, in regard to the settlement introduced into the villages of the Mamlutdar's division.

2. The rates proposed for this division have already been shown, the villages being included in the summary of the different rates given in paragraph 11 of the original Report. The following state-

ment shows the assessment under the rates in question, and the increase and decrease on past payments consequent on their introduction :—

	Rice.	Wurkus.	Total.	Assessment of Waste Lands.	Grand Total.
	Rs.	Rs.	Rs.		
Average annual revenue of the past ten years	67,480	9,726	77,206	....	....
Jummabundy of 1859-60, accord- ing to old rates	70,738	10,140	80,878	No record.	80,878
Ditto according to Survey rates.	68,018	9,215	77,233	6,237	83,470
Increase....	....	....	....	....	2,592
Decrease....	2,720	925	3,645	....	....

From this it will be observed that the jummabundy of this year, under the survey settlement, is almost the exact amount of our annual realizations, taking the average of the past ten years' collections. If, however, the settlement be compared with the jummabundy of this year, under the old rates, there is a decrease of Rs. 3,645,*

* Jummabundy
according to old
rates Rs. 80,878
Do. according
to Survey.. Rs. 77,233
Rs. 3,645

which represents the reduction on present cultivation. But so large a sum as Rs. 80,878 has never been realized from this division. The revenue of 1858-59, which was Rs. 79,835, or about a thousand less, is the largest collec-

tion on record ; so that the comparison above made is scarcely a fair way of exhibiting the result, inasmuch as it makes the reduction appear considerable, and the eventual gain on the survey settlement comparatively small ; for the kumal, by this way of comparing results, is only Rs. 2,592 more than the assumed revenue of 1859-60, whereas it is, in reality, above Rs. 3,500 in excess of the highest collection on record.

3. However, the fact of the survey kumal being a thousand rupees more or less, according to the year taken as the standard of comparison, is matter of little consequence. The real question is, whether the settlement represents fairly the proportion that this

district should contribute to the general revenues of the zillah under the scale of assessment now being carried out under the operations of the survey. This point has already been discussed in the original report, wherein the grounds on which the rates were fixed have been fully explained. The satisfaction with which they were received by the Ryots, and the absence of complaints against the settlement, may, I think, be taken as evidence of the correctness of the conclusions therein arrived at.

4. The following statement exhibits the result of the settlement for the two divisions, viz:—

	Jummabundy of 1859-60.								
	According to old Rates.			According to Survey Rates.					
	Rice.	Wurkus	Total.	Rice.	Wurkus	Total.	Waste.	Grand Total.	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Mamlutdar's division, 154 villages, inclusive of 3 Isafut	70,738	10,110	80,878	68,011	9,215	77,233	6,237	83,470	
Mahalkunty's division, 94 villages, inclusive of 2 Isafut	47,052	6,429	53,481	45,332	6,615	51,947	3,564	55,511	
	1,17,790	16,539	1,34,359	1,13,343	15,830	1,29,180	9,801	1,38,982	
Increase ....	..	....	....	....	....	....	....	4,623
Decrease .....	....	....	..	4,440	739	5,179	....	....

From this it will be seen that the new kumal is only Rs. 4,623 in excess of this year's jummabundy by the old rates. The circumstance of the large amount brought to account as the assumed revenue of that year has been explained in the preceding paragraph, in discussing the effect of the settlement on the Mamlutdar's division. But if the revenue for 1858-59 be taken as the standard of comparison, the kumal will then be shown to be above six thousand in excess of the highest realizations on record; and I consider this to be a satisfactory result for a district so wanting in natural and artificial advantages as Morbar.

* *Note.*—There is a difference of Rs. 124 between this and the amount given in statement in paragraph 25 of Report. The latter was made out from the rough papers, and this herein given is taken from the calculated assessment of each village.

5. The one anna extra rate, to provide a road and general improvement fund, has to be added to the assessment already given, as the order for its imposition did not arrive in time to admit of the necessary addition to the original assessment being made. The jumma bundy of all but about 30 villages had been completed ere the order was received ; and as the papers for the latter had been prepared, it could not have been carried out in their case without retarding the settlement beyond the usual period. I have, however, taken the necessary measures for its imposition, having personally informed the Ryots of the last-settled villages of their liability to the payment, and intimated this also by order through the Mamlutdar and Mahalkurry to the Ryots of those settled prior to the receipt of the Resolution upon this subject.

6. The Jemadars, Patels, and Mhars of the part of the Mahalkurry's division known as the Juree Sheroshee turuf are dissatisfied with the arrangement made at time of settlement with regard to their Inam holdings in wurkus lands, and have petitioned the Commissioner and yourself on the subject. The Inam belonging to the parties in question was entered in "Tuckas" in the old accounts of the village, the tucka being held to contain the extent of the wurkus as well as the rice land belonging to each holding. At Mr. Coles' revision of the assessment of this turuf, all the rice land held as Inam was regularly measured and recorded in the name of its respective holder ; and all the wurkus land *under cultivation in the year* in which his measurement was made, was likewise measured and recorded in the same way. The extent and value of the Inam holdings thus recorded have, from that time to the present, been regularly shown in the accounts of the village as the deduction on that account.

7. But under the system of triennial measurements of wurkus cultivation in force in this turuf and throughout the Morbar talooka, to the introduction of the settlement, the Tullatee has regularly measured the extent of such cultivation in the occupation of these Inamdars, and anything in excess of the value recorded in the accounts, in the manner explained in the foregoing paragraph, has been considered as liable to the payment of revenue. For instance, supposing an Inamdar to be entitled to Rs. 5 as wurkus Inam, and that his wurkus cultivation in the year amounts to Rs. 6, calculated at the rate of the turuf (which was eight annas per beegah, in this case), one rupee would be charged as assessment pertaining to

Government land, and be levied as revenue. From this it will be seen that the extent of the Inam of these parties in wurkus lands was not regularly defined at Mr. Coles' revision; and that, owing to the want of a proper record of the same, a certain sum has been assumed as its value, and continued as such to the present time.

8. When the survey was being extended to this turuf, inquiry was made as to the boundaries of the wurkus lands held as Inam; but as no sub-division of the Inam and revenue-paying portions of the same had been made at Mr. Coles' survey, I was unable to mark off the respective portions of each into separate numbers, and the whole was consequently divided off into numbers, as if it had been entirely revenue-paying land. On the introduction of the settlement this season, I allowed each party a deduction from the assessment of his wurkus lands to the value of the sum recorded as Inam at Mr. Coles' revision. The Inamdars are, however, very dissatisfied with this arrangement, as, owing to the large extent of wurkus land in their occupation, they will be charged in many cases double what they have hitherto paid. But as the parties in question are the holders of great part of the revenue-paying as well as the Inam wurkus lands of the village, it is impossible, in the absence of any previously-defined boundaries, to ascertain and mark off the portion belonging to each kind of tenure.

9. There can, I think, be little doubt that Mr. Coles' plan of recording as Inam *simply the extent under cultivation in the year of his survey* was not a fair settlement, for the cultivation of wurkus lands is subject to great fluctuation, owing to the necessity for occasional fallow. The hardship of the plan has not, however, been felt to the present, owing to the parties having been charged only for the land actually under cultivation; but now that they are called on to pay the assessment for all the land in their occupation, with the exception of the extent set apart as equivalent to Mr. Coles' value of the Inam, the case is very different, as, in many instances, they will have to pay two and three times the amount of their former payments.

10. It appears to me that the fairest way of settling this case is to allot off to each individual the extent he is entitled to, according to a calculation based on the value of the old "Tucka" measurements of the village; to adopt, in fact, the course followed with reference to certificates passed by the Inam Commission. With the view to carrying

out such a plan, I have prepared the following statement, which exhibits the value assigned as Inam by Mr. Coles (rice and wurkus included); the value according to the survey settlement; and the value worked out from the old tuckas in the manner above explained :—

Names of Villages.	Number of Tuckas.	Total Assessment according to Survey.	Value of Inam.		
			According to Mr. Coles' Survey.	According to Settlement made at Jum-mabundy.	According to calculations based on the Tucka.
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Vehlook	68 6 0	364 9 3	62 8 1	58 13 2	85 5 0
Alleweh	70 4 0	298 12 6	100 10 3	98 7 8	106 5 3
Kheir	38 2 0	310 1 0	42 10 11	54 9 1	130 2 0
Sailgaon	82 4 6	513 5 0	84 11 5	90 5 9	126 5 3
Wunoteh	36 14 0	146 3 3	27 3 5	27 12 1	39 10 1
Saie	24 8 6	168 13 3	39 11 1	43 14 0	48 2 10
Balowlee	39 10 4	207 12 6	41 3 3	37 12 0	52 6 7
Sheroshee	102 1 0	709 2 3	165 11 1	197 0 4	208 7 1
Mhan	64 12 0	792 7 3	76 2 8	80 13 9	195 13 1
Chasoleh	87 9 0	338 8 3	41 9 7	34 13 8	77 5 1
Ambewlee	36 8 0	220 15 9	43 14 5	54 4 0	60 7 5
Phanglosce	57 6 6	229 12 0	42 7 5	59 9 6	36 0 4
Tullegaon	202 4 6	1,374 11 0	341 9 11	308 9 9	441 11 3
Nudaie	97 9 6	515 7 9	89 2 2	87 0 9	145 4 1
Dhegaphul	19 0 0	59 13 9	42 14 9	42 6 0	40 15 4
Rupees	1,027 3 10	6,250 6 9	1,242 2 5	1,276 3 6	1,794 4 8

The value of the Inams in these several villages, calculated in the manner above explained, appears to be as follows, viz :—

According to Mr. Coles' survey Rs. 1,242 2 5

Do. present survey „ 1,276 3 6

Do. calculations based upon the tucka. „ 1,794 4 8

Looking at these results, it seems that there is a difference of only about Rs. 35 between Mr. Coles' and my own value of these Inams, but a difference of above Rs. 500 between our values, and that resulting from the calculation based upon the tucka; that is to say, supposing the latter plan of settling the value of these Inams to be adopted—and I would strongly urge its being so,—the Jemadars and people of this district will require to have wurkus land to the value of above Rs. 500 made over to them, in addition to that allowed by me at time of making the jum-mabundy.

11. It will not, perhaps, be convenient for the Inam Commission to inquire into this case at once. I think therefore that the plan suggested might be carried out, subject to their future decision ; and there can be little objection to this course, as the lands in question are held as service Inams, being in lieu of hucks in the case of the Jemadars of the turuf, and as payment for services as village officers on the part of the Patel and Mhars. In the latter case, there certainly can be no objection to the plan proposed, as the value of the service Inam will hereafter be fixed on the extension, to this district, of the scheme of remunerating Patels and Mhars, now being carried out in the collectorate. The turuf in which these Inams are situated is in the northern part of Morbar, adjoining Kolwun talooka ; and being the locality in which disturbances have frequently occurred, I think it would be bad policy to run the risk of spreading discontent amongst the influential people of this turuf, by not dealing liberally with them in reference to their claims in this case. The plan of settlement here proposed will, I think, be popular, and at the same time will give them what they are fairly entitled to.

12. There are two other turufs of the talooka in which the wurkus Inams were treated in the manner explained in the foregoing paragraphs ; but in their case the people were quite content with the settlement made. This is, no doubt, attributable to the circumstance of the extent of wurkus land, with reference to rice, being small in their case ; whereas the Inams, from being determined according to the cultivation of the year, are larger, with reference to the total area, than those of Juree Sheroshee, fixed upon the same plan, owing to the extent of wurkus being so much greater in the latter case. The application to these turufs of the plan recommended above would make very little change in their case ; but in whatever way the arrangement may affect them, it should, I think, be introduced to ensure uniformity of system in settling this question.

13. I have applied the rates to the Isafut villages of the district ; but the Isafutdars object to them, and seem to be determined to resist their levy. They claim the right to hold their villages at their present payments, which are less than the amount fixed by the survey ; but as they have no lease or sunnud conferring such right, their claim appears to me to be quite inadmissible. It seems that the rates of these Isafut villages were not subjected to revision at the time

Mr. Coles' settlement was carried out; but there would not appear to have been any regular plan of treating this class of villages at that time, for we find that in the Panwell talooka, and in Callian also, their rates were revised at the general settlement of the district; whereas in Morbar, as above mentioned, they were not included under the general operation. There can, however, be no question as to the right of Government to assess such villages when not held under a lease or special; guarantee and there is no such authority to bar proceedings in these cases.

14. With regard to the terms on which the Ryots should be placed under the settlement in this class of villages, there are many cases in which they now hold their lands as independent Sootedars at the fixed rates of the village, being on the same footing as Dharehkurrees in the southern talookas. The status of this class of tenants must, of course, be respected. There are other lands in the same village let at muckta and grain rents, according to agreement made with the Isafutdar. There are some villages (those in Panwell for instance) where the whole of the land is said to be let out at the fixed rate of the village, the Isafutdar in this case having apparently no profit, except that, at Mr. Davies' revision, the value of the land then waste was not included in the amount fixed for the whole village, so that a margin of profit was in this way left. There are other cases where the Isafutdar is himself the occupier of almost all the land, his profit in this case being derived from the cultivation of the same.

15. A statement, showing the lands held as sootee at the fixed rates, and those let in muckta or at grain rents, was prepared, and with this I submitted to the Isafutdars that they should collect only the survey settlement from lands of the former class, but that their grain and muckta rates should be continued on the latter, the terms being duly registered in the Ryots' receipt-book. It appears to me that this plan of settlement is fair to the Isafutdar, as it does not deprive him of any existing privileges, and at the same time leaves him the profit derived from grain and muckta rates as a remuneration for the management of the village. In cases where the lands are, for the most part, held in sootee by the Isafutdar or his family, he derives his profit from their cultivation, and no further remuneration is needed.

16. In the case, however, of villages like those in Panwell, which are entirely let out at the rates of the settlement, some way of remu-

nerating the Isafutdar for the management of the village seems to be required ; for if the whole assessment be taken from him, he can gain nothing, and will probably be a loser, as some of the lands will generally be waste. Mr. Davies is said to have excluded the value of the waste from the amount fixed as the assessment of the villages of this district. I think, however, it will be preferable to give the Isafutdar a percentage allowance for the management of the village—say, ten per cent. I would, however, deduct the amount allowed from the Survey Kumal, in preference to having it shown as an annual cash payment from the revenues. But this deduction should, I think, be allowed only in cases where the whole lands of the village are held at fixed rates by the Ryots.

17. I would suggest, then, that the Isafutdars be offered a lease of their villages for 30 years on the terms above explained, and that they be informed that the village will be resumed by Government unless they agree to the conditions specified. As the case now stands, they refuse to accept the settlement, and the introduction of the measure has been deferred for this season in Panwell on that account. Their objection is chiefly confined to the payment of the increase of assessment caused by the application of the Survey rates ; but there can, I think, be no doubt as to the right of Government to enforce the levy of this amount. A settlement of the terms on which these villages are to be leased out to the Isafutdars is urgently required, for at present matters are in an unsatisfactory state.

18. Four copies of the Diagram of Kinowly Petta are herewith forwarded, one of which I beg you will kindly insert in the body of the original Report facing paragraph 21 ; those for the Mamlutdar's division are in course of preparation, and will be forwarded as soon as ready.

In a tin-case.

I have the honour to be,

Sir,

Your most obedient Servant,

J. FRANCIS, Captain,
Supt. Revenue Survey and Assessment,
Tanna and Rutnagherry

**STATEMENT contrasting the Survey Settlement with past Payments for the Villages of the
Mamlutdar's Division of the Morbar Talooka.**

Number	Names of Villages.	Payments under present Settlement.				Assessment according to proposed Survey Rates.								Total Cultivation and Waste.
		Taken on the average for 10 years.	According to Jumma-bund of 1858-59.			Rate.	On the Cultivation of 1859-60.			On Waste Lands.				
			Rice.	Wurkus.	Total.		Rice.	Wurkus.	Total.	Rice.	Wurkus.	Total.		
1	• 2	3	4	5	6	7	8	9	10	11	12	13	14	
		Rs.	Rs.	Rs.	Rs.	Rs. a.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1	Kachkolee	413	434	91	525	4 8	411	78	489	35	51	86	575	
2	Thondlee	584	645	86	731	4 8	593	122	715	28	10	38	753	
3	Sasueh	409	440	41	481	4 8	417	52	469	19	15	34	503	
4	Naweh Khoord	515	548	56	604	4 8	523	89	672	20	38	68	730	
5	Borewlee	258	274	23	297	4 8	229	41	270	14	5	19	289	
6	Kanoleh	423	444	70	514	4 8	470	87	557	15	7	22	579	
7	Museh	653	671	123	794	4 8	687	101	788	30	40	70	858	
8	Cherud	421	442	50	492	4 8	388	61	449	30	1	31	480	
9	Aumbtambah	320	326	27	353	4 8	300	26	326	11	10	21	347	
10	Jamboordeh	546	584	42	626	4 8	536	31	567	18	14	32	599	
11	Ambehaon	725	743	64	807	4 8	612	92	704	71	48	119	823	
12	Kendoorlee	673	668	55	723	4 8	623	59	682	54	17	71	753	
13	Kondaleh	655	686	91	777	4 8	643	145	788	8	0	8	796	
14	Dhanowlee	358	375	48	423	4 8	389	43	432	4	7	11	443	
15	Mallair	616	608	71	679	4 8	628	83	711	14	3	17	728	
16	Puwaleh	1,005	985	236	1,221	4 8	992	220	1,212	71	24	95	1,307	
17	Balookh	649	671	97	768	4 8	624	71	695	33	5	38	733	
18	Wudowlee	762	766	78	844	4 8	748	94	842	116	3	119	961	
19	Kurowleh	1,139	1,217	227	1,444	4 8	1,048	68	1,116	33	177	210	1,326	
20	Asosch	417	435	39	474	4 8	443	29	472	19	2	21	493	

21|Wudoo	14	42	9	51	4	8	38	6	44	4	....	3	4	48
22|Chickleh	156	171	32	203	4	8	158	20	178	2	5	183	5	183
23|Wagewlee	878	883	130	1,013	4	8	854	66	920	40	57	1,017	97	1,017
24|Usoleh	817	803	113	916	4	8	864	118	982	41	9	1,032	50	1,032
25|Wajleh	338	345	36	381	4	8	323	43	366	31	17	414	48	414
26|Keesore*	376	384	37	421	4	8	356	45	401	19	1	421	20	421
27|Goraleh	402	411	56	467	4	8	452	40	492	13	....	505	13	505
28|Nondenee	152	154	33	187	4	8	164	17	181	4	1	186	5	186
29|Paishanee	265	265	35	300	4	8	233	14	277	14	8	222	22	299
30|Phunsalee	645	645	88	733	4	8	638	75	713	79	92	884	171	884
31|Pulluskhul	219	231	28	259	4	8	220	34	254	6	13	273	19	273
32|Seerowlee	939	940	127	1,067	4	8	1,079	119	1,198	33	8	1,239	41	1,239
33|Veerah	184	157	52	209	4	8	210	57	267	33	....	300	33	300
34|Sazate	687	748	111	859	4	8	702	92	794	15	1	810	16	810
35|Morbar	1,613	1,669	70	1,739	4	8	1,805	149	1,954	63	6	2,023	69	2,023
36|Tembreh, Boodrook ..	624	661	129	790	4	8	552	77	629	15	....	644	15	644
37|Koodowlee	600	583	66	649	4	8	536	47	583	72	10	665	82	665
38|Dhanewlee	344	361	43	404	4	8	309	53	362	34	7	403	41	403
39|Bramungaon	326	329	55	384	4	8	353	47	400	5	10	415	15	415
40|Seergaon	499	488	54	542	4	8	522	42	564	48	15	627	63	627
41|Tembgaon	200	194	26	220	4	8	165	37	202	31	....	233	31	233
42|Morae	476	479	98	577	4	8	450	84	534	22	7	563	29	563
43|Nuraie	415	463	70	533	4	8	451	97	548	3	17	568	20	568
44|Kotebghur	276	279	23	302	4	8	303	45	348	3	1	352	4	352
45|Boowun	733	724	76	800	4	8	732	59	791	6	....	797	6	797
46|Kullumkhund	520	525	65	590	4	8	464	87	551	2	....	553	2	553
47|Duhegaon	520	523	40	563	4	8	495	48	543	30	12	585	42	585
48|Dowpeh (Isafut)	452	452	55	507	4	8	495	55	550	23	2	575	25	575
49|Mohoghur	422	423	158	581	4	0	376	71	447	42	101	590	143	590
50|Patgaon	343	363	316	679	4	0	374	30	404	158	416	978	574	978
51|Agasee	571	576	71	647	4	0	531	48	579	40	10	629	50	629
52|Dunghurnaweh	944	978	93	1,071	4	0	885	62	947	30	41	1,018	71	1,018
53|Khanewda	518	537	56	593	4	0	528	49	577	7	24	608	31	608
Carried over.. Ra.	28,009	28,748	4,066	32,414	....	....	27,901	3,555	41,556	1,611	1,366	2,977	2,977	34,513

• Written "Kalar" in original rate statement.

No. of Villages.	Names of Villages.	Payments under present Settlement.				Assessment according to proposed Survey Rates.								Total Cultivation and Waste.
		Taken on the average for 10 years.	According to Jummabundy of 1858-59.			Rate.	On the Cultivation of 1859-60.			On Waste Lands.				
			Rice.	Warkus.	Total.		Rice.	Warkus.	Total.	Rice.	Warkus.	Total.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
		Rs.	Rs.	Rs.	Rs.	Rs. a.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
	Brought over..	Rs.				....							
54	Gowhlee	28,009	28,748	4,066	32,414	4 0	27,901	3,555	41,556	1,611	1,366	2,977	34,513	
55	Gagoorlee	328	350	37	387	4 0	312	60	372	20	17	37	409	
55	Gagoorlee	218	223	24	247	4 0	220	27	247	5	11	16	263	
56	Bandewlee	617	608	55	663	4 0	554	60	614	45	31	76	690	
57	Sakoorlee	468	456	41	497	4 0	430	62	492	68	34	102	594	
58	Narewlee	873	840	75	915	4 0	738	60	798	73	36	109	907	
59	Oochaleh	1,011	1,056	39	1,095	4 0	863	59	922	93	31	124	1,046	
60	Tullekul	329	352	18	370	4 0	285	17	302	10	1	11	313	
61	Kapolee	601	601	60	661	4 0	544	36	580	31	39	70	650	
62	Kulumbeh	710	726	91	817	4 0	624	61	685	12	78	90	775	
63	Tooleaie	360	380	61	441	4 0	302	37	339	31	16	47	386	
64	Kulumbhar	293	299	25	324	4 0	249	27	276	6	10	16	292	
65	Kanarleh	457	470	98	568	4 0	403	79	482	4	24	28	510	
66	Vedeh	1,048	1,076	72	1,148	4 0	974	92	1,066	43	68	111	1,177	
67	Dhairah	538	550	27	577	4 0	441	31	472	12	22	34	506	
68	Marus	501	530	60	590	4 0	476	50	526	45	56	101	627	
69	Raweh	474	501	49	550	4 0	471	84	555	57	25	82	637	
70	Jambghur	138	137	22	159	4 0	131	26	157	7	...	7	164	
71	Khandareh	597	632	66	698	4 0	584	85	669	15	39	54	723	
72	Sewleh	1,016	1,081	140	1,221	4 0	1,044	179	1,223	76	1	77	1,300	
73	Arebleh, Boodrook	527	540	53	593	4 0	564	69	633	12	1	13	646	
74	Koltun	1,045	1,101	106	1,207	4 0	1,048	133	1,181	53	32	85	1,266	
75	Manewlee, Boodrook ..	447	435	50	485	4 0	385	58	443	52	3	55	498	

76	Kandup	894	912	80	992	4	0	921	134	1,055	39	5	44	1,099
77	Badaneh	829	861	83	944	4	0	793	123	916	63	6	69	985
78	Kasgaon	1,397	1,377	113	1,490	4	0	1,152	149	1,301	49	130	179	1,480
79	Kootul	529	514	46	560	4	0	466	67	533	34	4	38	571
80	Nandgaon	288	299	27	326	4	0	318	48	366	13	25	38	404
81	Surulgaon	1,163	1,172	133	1,305	4	0	1,297	166	1,463	59	6	65	1,528
82	Mohopeh	337	354	40	394	4	0	422	70	492	41	....	41	533
83	Nagaon	1,195	1,234	95	1,329	4	0	1,163	164	1,327	62	16	78	1,405
84	Dhywulee	490	507	28	535	4	0	502	57	559	10	....	10	569
85	Majgaon	692	716	45	761	4	0	728	75	803	10	17	27	830
86	Manewlee, Khoord	482	503	46	549	4	0	515	73	588	95	22	117	705
87	Tooneh	334	339	17	366	4	0	326	40	366	7	11	18	384
88	Pureh	533	560	23	583	4	0	575	27	602	45	42	87	689
89	Kandlee	182	189	10	199	4	0	187	31	118	14	6	20	238
90	Ojewleh	294	330	23	353	4	0	328	19	347	5	26	31	378
91	Ambleh, Khoord	208	215	21	236	4	0	182	26	208	22	17	39	247
92	Sakreh	1,227	1,247	114	1,361	4	0	1,208	142	1,350	44	59	103	1,453
93	Kurchondeh	207	228	121	349	4	0	232	63	295	14	....	14	309
94	Heraghur	185	174	18	192	4	0	180	16	196	21	4	25	221
95	Kalehwurkul	149	147	54	201	4	0	189	41	230	26	....	26	256
96	Tembreh, Khoord	179	182	23	205	4	0	163	32	195	1	6	7	202
97	Mandweh	105	106	23	129	4	0	85	22	107	2	6	8	115
98	Seelund	176	182	54	236	4	0	162	19	181	13	22	35	216
99	Kanghur	174	171	21	192	4	0	137	25	162	17	5	22	184
100	Berwarree	173	172	22	194	4	0	163	34	197	12	16	28	225
101	Tulleh	115	104	31	135	4	0	110	22	132	22	1	23	155
102	Manewlee	544	585	127	712	4	0	615	84	699	56	38	94	793
103	Sadolee	351	415	36	451	4	0	382	32	414	30	3	33	447
104	Potgaon (Isafut)	318	318	37	355	4	0	462	55	517	34	23	57	574
105	Masleh (Isafut)	307	307	77	384	4	0	600	36	636	77	....	77	713
106	Dusaie	698	717	64	781	4	0	784	100	884	80	18	98	982
107	Tulowlee	396	441	27	468	3	8	455	46	501	11	5	16	517
108	Keesul	813	826	75	901	3	8	761	66	827	43	62	105	932
Carried over.. Ra.		58,569	58,096	7,059	61,695	....		56,186	7,051	63,154	3,442	2,542	5,994	69,231

Number.	Names of Villages.	Payment under present Settlement.			Assessment according to proposed Survey Rates.										Total Cultivation and Waste.
		Taken on the average for 10 years.	According to Jummabundy of 1858-59.			Rate.	On the Cultivation of 1859-60.			On Waste Lands.					
			Rice.	Wurkus.	Total.		Rice.	Wurkus.	Total.	Rice.	Wurkus.	Total.			
1	2	3	4	5	6	7	8	9	10	11	12	13	14		
		Rs.	Rs.	Rs.	Rs.	Rs. a.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.		
	Brought over..	Rs.													
109	Mahaj	58,569	58,096	7,089	64,695	....	56,186	7,051	63,154	3,442	2,542	5,994	69,231	
110	Doodnolee	169	173	22	195	3 8	185	29	214	3	2	5	219		
111	Kalosee	238	257	56	313	3 8	299	25	324	4	20	24	348		
112	End	197	205	68	273	3 8	211	54	265	6	24	30	295		
113	Kaiduleh	629	661	53	714	3 8	668	95	763	106	41	147	910		
114	Ulleance	372	376	28	404	3 8	349	47	396	3	1	4	400		
115	Pimpulghur	192	198	26	224	3 8	219	47	266	13	8	21	287		
116	Chope	80	80	4	84	3 8	86	6	92	30	7	37	129		
117	Saeelghur	212	227	23	250	3 8	251	21	272	17	13	30	302		
118	Oombrolee, Boodrook..	638	660	60	720	3 8	667	106	773	45	10	55	828		
119	Bulehgaon	257	261	29	290	3 8	271	27	298	13	8	21	319		
120	Tokowdeh	771	793	104	897	3 8	754	92	846	28	76	104	950		
121	Ghera Killeh, Sidghur..	146	145	13	158	3 8	141	6	147	6	2	8	155		
122	Tulowlee	21	11	18	29	3 0	15	1	16	30	58	88	104		
123	Wyshakureh	595	593	41	634	3 0	603	67	670	7	5	12	682		
124	Mur	506	522	151	673	3 0	470	123	593	9	....	9	602	
125	Kullumbhar	238	267	85	352	3 0	249	58	307	10	11	21	328		
126	Kawareh	377	433	98	531	3 0	402	23	425	5	67	72	497		
127	Naigaon	265	276	59	335	3 0	273	63	336	4	15	19	355		
128	Padleh	218	222	43	265	3 0	217	12	229	5	41	46	275		
129	Deoghur	186	203	46	249	3 0	233	47	280	2	26	28	308		
130	Mandwuth	42	43	14	57	3 0	61	9	70	13	6	19	89		
		115	128	9	137	3 0	115	22	137	12	3	15	152		

131 Yeklureh.....	361	371	119	490	3	0	409	118	527	10	16	26	553
132 Duhegaon	191	205	44	249	3	0	212	46	258	3	12	15	273
133 Puloo	478	496	177	673	3	0	490	149	639	16	92	108	747
134 Sanowleh	1,047	1,114	174	1,288	3	0	1,040	180	1,220	9	35	44	1,264
135 Manewlee	131	137	24	161	3	0	161	16	177	8	7	15	192
136 Jarghur	221	241	127	368	2	8	230	53	283	2	4	6	289
137 Kootul	295	333	141	474	2	8	346	90	436	8	17	25	461
138 Pangneh	169	175	87	262	2	8	159	73	232	4	2	6	238
139 Oombrolee, Khoord ..	234	249	66	315	2	8	239	65	304	1	11	12	316
140 Pendree	127	135	118	253	2	8	142	76	218	5	...	5	223
141 Kapree	369	378	105	483	2	8	388	92	480	4	17	21	501
142 Hehdowlee	98	100	26	126	2	8	104	21	125	3	...	3	128
143 Koorshait	122	124	113	237	2	8	154	47	201	1	3	4	205
144 Walewreh	31	34	174	208	2	0	47	5	52	8	67	75	127
145 Merdee	87	104	163	267	2	0	116	53	169	6	2	8	177
146 Sawurneh	17	5	23	28	2	0	6	...	6	11	38	49	55
147 Phagoolguwan	58	67	83	150	2	0	60	8	68	1	40	41	109
148 Boranden	53	48	124	172	2	0	50	35	85	1	23	24	109
149 Neyadee	223	219	92	311	2	0	199	83	282	17	32	49	331
150 Morosee	70	74	52	126	2	0	64	61	125	1	...	1	126
151 Dewanpara	23	24	56	80	2	0	26	5	31	1	5	6	37
152 Oodaldoho	27	29	9	38	2	0	27	5	32	...	...	...	32
153 Tethbee	15	9	87	96	2	0	9	...	9	5	41	46	55
154 Killeh, Gorukgur.....	....	....	2	2	....	....	....	....	....	....	1	1	1
Total... Rs.	67,480	69,511	10,325	79,836	....	....	67,603	9,312	76,915	3,948	3,451	7,399	84,314

NOTE.—The following changes were made in the rates originally proposed as per statement accompanying Report, viz.:—

Villages transferred from Class 2nd to Class 1st :— Balookh, Wudowlee. *Villages transferred from Class 1st to Class 2nd :—* Sewleh, Ambleh, Boodrook.
Villages transferred from Class 2nd to Class 3rd :— Khesul, Tulowlee, Kaiduleh, Salseseeigur.
Villages transferred from Class 3rd to Class 4th :— Mandwath.

J. FRANCIS, Captain,
 Supt. Revenue Survey and Assessment, Tanna and Rutnagerry.

(*Collector of Tanna's letter, No. 561, dated 30th March 1860, and No. 2189, dated 16th November 1860, forwarding Captain Francis' Reports on the assessment of the Morbar talooka.*)

No. 2788 OF 1860.

REVENUE DEPARTMENT.

*Revenue Commissioner's Office,
Camp Kunhur, 24th December 1860.*

Submitted to Government for orders.

2. The settlement of the Morbar talooka, undertaken in January 1860, occupies two separate reports—one for the Mamlutdar's division, and the other for the Mahalkurry's. This was unavoidable, as the classification of the soils in the former could not be completed in sufficient time to admit of the preparation of the necessary papers before Captain Francis left for Rutnagherry. Mr. Morgan did well to authorise the revision of the assessment on the data furnished in the report on the Mahalkurry's charge; and the settlement of the district so soon after its classification reflects credit on Captain Francis, as evincing his zeal for the public service.

3. The district just settled is described to be very unfavourably circumstanced with regard to means of transport, the greater portion of its surface being too rough and undulating for cart traffic, and nothing in the shape of roads having as yet been done towards remedying these natural defects. Its inhabitants are therefore at a disadvantage when compared with the people of the other districts revised by the Survey, in not possessing facilities for the conveyance of produce to the great markets along the coast. They are, however, not badly off. The old assessment, introduced, under orders from Government in 1837-38, by Mr. George Coles, then Assistant Collector of Tanna, has been very beneficial in its effects, and has improved the resources of the Ryot. The remissions annually allowed at the jumma bundy since the above year have been but trifling in amount.

Captain Francis'
paragraph 9.

4. Captain Francis' settlement may therefore be considered to be an equalisation of the rates on the Revenue Survey principles. The rates proposed by him, and assented to by the Collector, are as follows :—

For 1st class villages	Rs.	4	8	0 per acre.
2nd do. do.	„	4	0	0 per do.
3rd do. do.	„	3	8	0 per do.
4th do. do.	„	3	0.	0 per do.
5th do. do.	„	2	8	0 per do., and Rs. 2.

They are similar to those introduced into the Nusrapoor talooka, the considerations which influenced the latter being applicable to the former also. The consideration with which Captain Francis has treated the jungly villages, inhabited for the most part by Colie tribes, has the full concurrence of the Revenue Commissioner.

5. A slight alteration has been made by Captain Francis in the grouping of the villages since their classification at the date of his first report; but this is of no material consequence. The following statement contains a synopsis of the proposed settlement :—

Division or Charge.	No. of Villages.	Average of the Collections for ten years.	Jummabundy of 1853-60, if according to old rates.			Jummabundy of 1859-60, according to Survey rates.			Survey rates on Waste.	Total Survey Kunal for the District.
			Rice.	Warkua.	Total.	Rice.	Warkua.	Total.		
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Mamlutdar's ..	154	67,480	70,738	10,140	80,878	68,018	9,215	77,233	6,237	83,470
Mahalkurry's ..	94	45,136	47,052	6,429	53,481	45,332	6,615	51,947	3,504	55,511
Total..	248	1,12,616	1,17,790	16,569	1,34,359	1,13,350	15,830	1,29,180	9,801	1,38,981
Increase		16,564	....	....	....	....	....	....	..	4,022
Decrease .....		....	....	....	....	4,440	739	5,179	..	....

It shows a decrease of Rs. 5,179 as compared with what would have been realizable (in 1859-60) according to old rates; and there is also a deficit of Rs. 3,451 when compared with the collections of the preceding year, 1858-59. But against this reduction must be placed, as a set off, the revenue derivable under the survey from tracts set apart

for grazing purposes, and from the dullé, cultivation hitherto unassessed, which have not been included in the above account; the comparison, then, will bear a more favourable aspect. A contrast with the average of the collections for the past ten years, gives an increase in favour of the settlement under review of Rs. 16,564.

6. The wurkus lands of the district generally are of little or no value, except as supplying rab. They have therefore been assessed at three annas per acre, being one anna less than the maximum standard determined by Government. A few villages, somewhat advantageously situated with reference to means of transport, have, however, been rated at four annas.

7. On the whole, the new settlement may be viewed as satisfactory. Captain Francis' observations in support of his measures are so replete in themselves, that the Revenue Commissioner thinks he cannot do better than refer to them for any further information or explanation which His Excellency in Council may consider necessary.

8. The rubbee lands in the talooka are very limited in extent. The revenue realized therefrom in 1858-59 being only Rs. 19, they have been assessed at the usual rate of Rs. 1-8-0 per acre.

9. Paragraphs 26 and 27 of Captain Francis' first report, No. 21, treat of the lands belonging to the Panderpeshas of the district. The *more definite information* therein promised has not been supplied in his second report, No. 324; but it is presumed that a record of those lands has not been found, and that they have been dealt with in the same manner as the holdings of other Ryots. A reference has been made to the Collector of Tanna, requesting him to state the mode of settlement adopted in the case of these Panderpeshas, and his reply will be duly communicated to Government on receipt.

10. With regard to the Isafutdars, Government have already decided as follows (paragraph 8 of their Resolution, No. 2662, dated 9th July 1859):—

“The Isafutdars do not hold their villages either wholly or partially exempt from payment of revenue, and it is not proposed now to question their title to the Isafut tenure. There is no objection therefore to the assessment of these villages, whether higher or lower than before, being enforced by the Collector simultaneously with the introduction of the revised settlement.”

This decision, it is to be remembered, was based on the statement No. 128, dated 11th March 1859. made in paragraph 34 of Captain Francis' report on the assessment of the Callian and

Tullojah talookas, to the effect that, "whenever a general revision of assessment" had "been made, the Isafut villages" were "invariably included under it;" but it now turns out that the Isafut villages in the Morbar talooka were *not* included in Mr. Coles' settlement; and Captain Francis states that "there would *not* appear to have been

Paragraph 13 of his, any regular plan of treating this class of villages No. 324. at that time." The right of Government to enforce

the survey assessment is undeniable, and is not questioned; but Captain Francis now suggests a lenient method of settlement concerning them; and believing that the fact of the Isafutdars having enjoyed their so-called rights for a long time, coupled with the circumstance of concessions having been made in their favour in Mr. Davies' settlement by the *exclusion*, from the amount payable by them, of the value of the *waste* lands in their villages, entitles them to some consideration, the Revenue Commissioner sees no objection to its adoption, and begs to recommend it accordingly for the sanction of Government.

11. There is another subject forming a portion of the settlement under report which calls for serious attention, viz. the wurkus inams of the Jemadars, Patels, and Mahars of some of the turufs of the Morbar talooka. The Revenue Commissioner concurs entirely with Captain Francis in the views expressed by him in paragraphs 6 to 12 of his report No. 324, and begs to second the arrangement therein proposed, which appears to be just and equitable. The difference between it and the result of Mr. Coles' survey, amounting to some Rs. 500, cannot fairly be viewed as a sacrifice, since that survey was confined to *one* year (the year in which it was conducted), and consequently not in any way indicative of the real state of affairs. But supposing even that it is so looked upon by Government, the object which it is calculated to secure seems to Mr. Mansfield a sufficient reason for its being authorised as a measure of policy. There appears to be no necessity for any reference to the Alienation Department; as the Inamdars cannot show their boundaries, nor state what extent of land they are entitled to. Its decision could only be founded on equity, as Captain Francis', and nothing more.

S. MANSFIELD, Revenue Commissioner, N.D.

No. 1178 OF 1861.

REVENUE DEPARTMENT,

Dated Bombay Castle, 12th March 1861.

To the REVENUE COMMISSIONER, N.D.

The PUBLIC WORKS DEPARTMENT of the SECRETARIAT.

Copy of the Resolution passed by Government on the foregoing Documents.

His Excellency the Governor in Council sanctions the adoption of the several rates of assessment fixed by Captain Francis for the Mahalkurry's and Mamlutdar's division of the Morbar talooka of the Tanna Collectorate.

2. These rates appear to have been already introduced under the authority of the Collector, and a contrast with the average of the collections for the past ten years is stated to give an increase, in favour of the new settlement, of Rs. 16,564. Government concur therefore with the Revenue Commissioner, N. D., in considering the settlement as satisfactory.

3. The result of the reference which has been made by the Revenue Commissioner, N. D., to the Collector, in the case of the Panderpeshas of Morbar, has been submitted to Government with Mr. Mansfield's memorandum of 24th January, and will be separately disposed of.

4. The Governor in Council agrees in the views expressed by Mr. Mansfield with regard to the Isafut villages of the district, and approves of the method of settlement proposed by Captain Francis for those villages.

5. The arrangement suggested by Captain Francis, in reference to the wurkus inams of the Jemadars, Patels, and Mahars of that part

of the Mahalkurry's division known as the Juree Sheroshee turuf is, as recommended by the Revenue Commissioner, authorised as a measure of policy.

6. The opinion recorded by the Revenue Commissioner, as to the promptitude with which the settlement of the district was made by Captain Francis soon after its classification, is fully concurred in by Government.

7. Extracts from the communications noted in the margin, on the

Paragraphs 6 and 7 of Captain Francis' report No. 21, dated the 13th January 1860.

Part of paragraph 3 of Mr. Mansfield's memorandum No. 2788, dated the 24th December 1860.

subject of roads, to be transferred to the Public Works Department of the Secretariat for information, and for the issue of such orders as may be deemed necessary.

A. D. ROBERTSON,
Acting Secretary to Government.

No. 115 OF 1861.

REVENUE DEPARTMENT.

Memorandum by the Revenue Commissioner, Northern Division.

The following letter
from the Collector of
Tanna.

Submitted to Government in continuation
of the Revenue Commissioner's memorandum,
No. 2788, dated 24th December 1860, para-
graph 9.

S. MANSFIELD,
Revenue Commissioner, N.D.

Bombay, 24th January 1861.

No. 133 OF 1861.

Tanna Collector's Office, Purga,
18th January 1861.

From J. R. MORGAN, Esq.,
Collector of Tanna,

To S. MANSFIELD, Esq.,
Revenue Commissioner, N.D.

SIR,—With reference to your endorsement No 2789, dated 24th ultimo, forwarding extract paragraph 9 of your review of the Morbar settlement report, No. 2788, dated 24th idem, I have the honour to inform you that, on calling upon Captain Francis, Superintendent Revenue Survey, for report, this
No. 13. officer, under date the 5th January, states—

“I beg to explain that, on examining the accounts of the district, I found that there is no record of any specific lands having been assigned to the Panderpeshas at a lower rate than is paid by other Ryots. Their claim to a privilege of the nature above stated was consequently considered inadmissible, and the survey settlement was applied to their holdings on the same terms as to those of the Ryots of the district.

I have the honour to be, &c.

J. R. MORGAN,
Collector.

No. 1428 of 1861.

REVENUE DEPARTMENT,

Dated Bombay Castle, 26th March 1861.

To the REVENUE COMMISSIONER,
Northern Division.

*Copy of the Resolution passed by Government on the foregoing
Documents.*

Captain Francis' proceedings may be approved.

A. D. ROBERTSON,
Acting Secretary to Government.

BOMBAY :

PRINTED AT THE EDUCATION SOCIETY'S PRESS, BYCULLA.

**SELECTIONS FROM THE RECORDS OF THE BOMBAY
GOVERNMENT.**

No. LXV.—NEW SERIES.

R E P O R T
ON THE
ROAD TO MAHABULESHWÜR,
VIA
AMBUR KHIND AND MUNDUR DEW.

BY
LIEUTENANT COLONEL R. PHAYRE,
QUARTER MASTER GENERAL
WITH GOVERNMENT RESOLUTION.

~~~~~  
**WITH TWO MAPS.**  
~~~~~

Bombay:
PRINTED FOR GOVERNMENT,
AT THE
EDUCATION SOCIETY'S PRESS, BYCULLA.

1862.

No. 1457 of 1862.

PUBLIC WORKS DEPARTMENT.

From the REVENUE COMMISSIONER, Southern Division,

To the SECRETARY to GOVERNMENT, Bombay.

SIR,—I have the honour to forward, for the consideration of Government, the accompanying very interesting letter addressed to me by Lieutenant Colonel Phayre, Quartermaster General of the Army, describing his survey and the cutting of trial-paths along the alternative lines surveyed by him, with a view of bringing the Sanitaria of Malcolm Peth and Paunchgunny into easier communication with the great military station of Poona.

2. Neither of the lines* A, B, C, D, *viâ* the Koorul Khind, or A, G, C, D, *viâ* the Ambur Khind, would

* *Vide* Sketch Map annexed to Colonel Phayre's letter. be of much use in a commercial point of view, or as means of exit for the produce of our own districts; for even if it should be found that the mountain range which separates the valleys of the Krishna and the Neera could be crossed as easily at the Ambur Khind as at the Kamatkhee Ghaut, and that it would be as cheap and as direct to bring the Poona and Sattara road over the Ambur Khind through *Wae*, instead of, as intended, over the Kamatkhee Ghaut through *Bhoinj* to Sattara, still almost all the country opened out by doing so would be one that belongs to the Punt Suchew, and not, as in the other case, to our Government.

3. But it will be observed that the chief advantage contemplated by Lieutenant Colonel Phayre, in the construction of a road by the Ambur Khind, is one which cannot be judged of as a question directly affecting the revenue, and there is no doubt that it would render more easily accessible the high land at Mundur Dew, which he describes as apparently well calculated for a permanent residence for Europeans.

4. In his 27th paragraph Lieutenant Colonel Phayre shows that he has expended Rupees 4,647-9-4, of which Rupees 1,500 were received as a donation from the Punt Suchew, who however, from what is stated at the close of Colonel Phayre's 19th paragraph, will probably wish to retract his gift. Under any circumstances, I have little doubt that Government will take care that Lieutenant Colonel Phayre is not allowed to suffer pecuniary loss in consequence of having undertaken and carried out the survey and the work, the result of which he reports in this letter. I beg the attention of Government to this matter, as the reimbursement of Lieutenant Colonel Phayre will require their particular sanction.

I have the honour to be, &c.

W. HART,

Poona, 24th June 1862.

Revenue Commissioner, S. D.

P. S.—Since writing the above, I have received from Lieutenant Colonel Phayre the plan and description of the Mundur Dew tableland, promised in paragraph 22 of his letter, and beg to forward them along with it.

A Minute by His Excellency the Commander in Chief, containing remarks on Lieutenant Colonel Phayre's letter, is herewith forwarded.

W. HART,

Revenue Commissioner, S. D.

No. 985 of 1862.

From Lieutenant Colonel R. PHAYRE,
Quartermaster General of the Army,

To W. HART, Esq.,
Revenue Commissioner, Southern Division.

SIR,—Amongst the many Indian questions that occupied the attention of the Local and Home Governments some three or four years ago, none excited more interest than that which treated of the sanitary tracts of country in each presidency, their undoubted utility, and the state of their communications.

2. So far back as February 1860 the views of the Government of India upon this subject were summarised in several circular letters from Major Atkinson, Officiating Secretary in the Military Department, from one of which (No. 952 B), to the address of the Secretary to Government, Military Department, Bombay, I would quote one or two short sentences, as bearing upon the question I have now the honour to submit for your consideration—

Paragraph 5. “I am desirous to observe that the object of the measure sanctioned is one of humanity, as regards our European soldiers.”

3. The measure here referred to is thus explained in paragraph 3 of the same letter, viz :—

“The possibility of making greater use of those Sanitaria which are already partially and occasionally occupied.”

Again, paragraph 10—

“It must not be forgotten that this is not by any means a purely medical question. Unless it can be made easily accessible, the best climate is of little value as a military sanitarium, and there are many circumstances, such as character of the scenery, and the means of obtaining occupation and amusement which, in the case of men no less than officers, may materially affect the health of the troops.”

4. The Bombay Government resolution No. 4064 of August 1859, in paragraph 10, refers to the stations of Paunchgunny and Mahableshwur, as noticed by Dr. Morehead in his report referred to.

5. In the 11th paragraph of that report Dr. Morehead says—

“Malcolm Peth is rendered uninhabitable from the middle of June to the end of September by incessant rain and fog, consequent on its position on the western side of the mountain; but it is to this position also that are due a greater coolness and softness of the climate in March, April, and May. There are localities on the eastern side of Mahableshwur which possess a climate nearly resembling that of Poorundhur, in which the temperature is about three degrees higher than that of Malcolm Peth, the fog less constant during the rainy season, and the rain-fall about 50 inches. Paunchgunny (distant 14 miles from Malcolm Peth, overlooking the valley of Waec, at an elevation of 4,000 feet) is the locality on the eastern side of which the character of the climate is best known. Notes on the monsoon climate of Paunchgunny have been published in the 3rd number of the Transactions of the Medical and Physical Society of Bombay.”

6. In his 33rd paragraph, Dr. Morehead speaks as follows:—

“Should, however, the distance to Mahableshwur be found inconvenient to regiments in the Southern Maratha Country or in Khandeish, or, after the railway lines are completed, to those in Central India, then other hill stations may be sought for north and south of Mahableshwur on the ghaut range itself, or on the spurs that project inland from its easterly side,—it being borne in mind that if the sanitarium is for the hot season *alone*, then a westerly position on the ghaut range is very important; but that if the rainy season is to be included, then a situation on the eastern side of the ghauts, or more inland *on the projecting spurs*, must be sought for, and the full advantages of the Deccan hills in the hot season be in some measure sacrificed.”

Dr. Morehead's proposal to look for a new permanent Sanitarium inhabitable throughout the year.

7. I trust that these extracts, establishing the value of Paunchgunny and Mahableshwur (or Malcolm Peth) as sanatoria, and the resolution of Government as to the necessity of ascertaining our resources in regard to the sanitary tracts of this presidency, and their communications, may prove a favourable introduction to the subject of this letter.

8. It seems to be generally acknowledged that the sphere comprised within the accompanying sketch, extending from Poona on the north to Sattara on the south, and the Syadree range on the west, is, from its geographical position, climate, soil, and water, the most likely to prove of use to Government in furthering any projects that they may now or hereafter entertain in regard to the temporary or permanent settlement of such Europeans as may be desirous of finding either a temporary hot-weather retreat, or a home in this part of India.

9. In the northern portion of the tract under report (between Poona and the Bhore territory), we find the hill forts of Singhur and Poorundhur, both of which, so far as their extent and position (with reference to the sea) admit of, answer the sanitary objects for which they are at present used.

10. In the southern portion we meet with four extensive offshoots from the Syadree range, stretching to the east and south-east for 20 and 30 miles, and maintaining an average height of about 4,000 feet above the level of the sea, though certain points on them are supposed to run as high as 4,500 feet, which is the average level of Mahableshwur, the highest point of which is 4,700 feet.

11. It is to these spurs that I wish to draw particular attention, as affording the most central, extensive, and generally capable sanitary area that we possess in the Bombay presidency. Their general character as to climate is, that at their western extremities on the Syadree they are not inhabitable, or rather not suited to European objects and mode of life, from the middle of June to the beginning of October, owing to the incessantly heavy rain-fall during that period, amounting, on an average, to nearly 250 inches annually.

12. Following their easterly course, however, this heavy rain-fall gradually diminishes, until a line of country is attained (as at Paunchgunny) where it is scarcely one-fourth of what falls on the

Syadree, and hence quite adapted to the mode and habits of life of Europeans all the year round. It is therefore to the discovery of such spots, no less than to the several lines of communication connecting them with each other and our principal cantonment at Poona, that my leisure time has been directed for the last few months.

13. It will be seen from the sketch that the first of the four spurs

Koorul Khind.

Ambur Khind.

Kamatkhee Khind.

Salpee Khind.

of which I am speaking (branches from the main range at a point south of the Wurunda Ghaut and extending eastward for upwards of 30 miles) terminates near

the Salpee Ghaut, on the old Neera and Sattara road. It is crossed at right angles, and at certain intervals, by the four passes as per margin, the approaches to which, in three instances, are well adapted for the construction of easy roads in the modern style.

14. The second (and the least extensive of the four) branches from the Mahableshwur plateau, near the village of that name, and, extending about 20 miles to the eastward, terminates at a point south of the town of Waee. On the east side of this spur, at about twelve miles from Mahableshwur, is situated the new European settlement of Paunchgunny, which at present consists of eight or nine families, and affords, I believe, a satisfactory example of the kind of settlements which the spurs of which I am speaking are capable of providing for. Without the least intention of under-rating the value of this little station, I may mention what was told me by a late civil officer of the district, viz. that the agricultural capabilities of the place and its vicinity were too limited to allow of its ever affording a large enough field for many enterprising Europeans, whose sole means of livelihood and occupation in Indian districts would consist in farming on a scale adequate to their support, and hence that many Paunchgunnys would be required in course of time.

15. Of the third spur (which branches from the same plateau and, taking a south-easterly direction, terminates at a point little north of Sattara) I cannot speak, never having examined it.

16. The fourth and southernmost one I was enabled to survey in 1858, through the kind and liberal support of the late Lord Elphinstone, who was then Governor of Bombay. The object of that survey was identical with the one undertaken this year: it was

sought to unite Enteshwur Kass and Mahableschwur by a road following the summit or side of the spur as occasion might require. Some of the district officers were of opinion that the neighbourhood of Kass would afford a good site for the settlement of European agriculturalists. Captain (now Lieutenant Colonel) Kennedy had also a project for increasing the supply of water at Sattara, by feeding the Enteshwur aqueduct from the Oormooree river, which takes its rise at Kass. My survey was unavoidably stopped after the first month or six weeks from its commencement, owing to the paramount necessity which existed at that time for stopping all public works except those of the most obvious emergency. So far, however, as I had the opportunity of observing, I found the spur from Galdew on to Kass well watered, and though very narrow in most places, yet here and there affording eligible sites for small farms.

17. From that time up to October last I had no opportunity of resuming my trial surveys through the tract generally. At the beginning of that month, however, my attention was again attracted to the same object in the Bhore direction, with the two-fold purpose of laying out for cart traffic the shortest possible line between Poona and Mahableschwur, and of turning to account, for sanitary purposes, the hill through which such a line would have to pass. I had also regard to the improvement and opening out of what is, I believe, one of the richest, best watered, and most highly cultivated tracts of country in the neighbourhood of Poona; and lastly, I felt that to avoid the Sheerwul and Wae line of country, were it merely on account of the cholera which annually ravages it, was in itself, independently of the saving of distance and other advantages, an object well worthy the undertaking. I shall now therefore have the honour to communicate an account of the commencement and result of my survey operations in the direction indicated.

18. Early in October 1861 I obtained His Excellency Sir William Mansfield's permission to wait upon the Honourable the Governor, for the purpose of soliciting His Excellency's sanction to my project, which I fully understood was to be undertaken upon my own responsibility, in regard to attendant expenses for such hired labour as might be necessary in carrying it out.

19. Sir George Clerk was kind enough to grant his assent, and desired me to communicate on all essential matters with Mr. George Inverarity, the Collector of Sattara, and yourself. As the survey was to commence at once in the Bhore chief's territory, I lost no time in obtaining the requisite authority for its prosecution, through the Collector, who, on my explaining that I proposed to

* Point B.

unite Captain Hart's * Koorul-Khind line with Bhore by a bridle-path, practicable for horses and palkees, obtained for me, from the Punt Suchew of Bhore, a grant of 1,500 Rupees towards the expenses of the work. During subsequent intercourse, however, with Mr. Inverarity on this

Between Captain Hart's road and the River Neera.

subject, he stipulated that the bridle-path should be widened into a cart-road of twelve feet, or that he must withdraw his grant. I therefore agreed to endeavour to have the portion in question widened to such a cart-road by March 1863, or return the money, should it be so ordered hereafter. I mention this circumstance here, though the stipulation about the cart-road only occurred some three months after the work of the bridle-path had been in progress.

20. My preliminary arrangements for the undertaking having been completed, I determined not to address you on the subject at all until I could report the results now obtained.

21. Commencing at the point **A**, on the Poona and Waeë road, which is 19m. 7f. 39yds. from the bazaar

From Flagstaff, Poona bazaar,	M.	f.	yds.
to A	19	7	39
A to B	23	6	76
B to C	6	4	119
C to D	11	4	3
D to Flagstaff.	4	0	20
Total	65	6	37

flagstaff of the former place, I carried my trial-path at a width of six feet across the best levels of the country to the point **B**, where I struck Captain Hart's Bhore and Waeë road by the Koorul Khind. This I availed myself of from **B** to **C**, a distance of about $6\frac{1}{2}$ miles. At **C** I recommenced my trial-path, and turning the

Kummulghur spur at Asgaum, I made direct for the Mahableshwur plateau near Kate's Point at **D**, a distance of rather more than eleven miles, that point again being four miles and a few yards from the bazaar flagstaff at Malcolm Peth.

22. The curve from **A** by Bhore, through the Koorul Khind, to **C**

Line by the Ambur Khind.

having thus proved four or five miles longer than I expected, owing to the numerous small curves encountered, I determined to try from **A** by **E**, **F**, **G** to **C**, which I have found to be not only shorter, easier of construction, and better watered than the Bhore curve, but has led me to a fine plateau called Mundur Dew, which, as well as other

Mundur Dew.

parts of the same spur, will on examination, I think, be found to possess all the sanitary and agricultural qualifications, as to soil, water, and climate, that we are in quest of. I have now a surveyor at work, preparing a separate plan

D. Morehead's 33rd para.

of the Mundur Dew table. I purpose therefore to defer any further account of it until that plan is ready. The accompanying sketch, however, will be sufficient to show that this is but a small part of the offshoot described in the 13th paragraph of this report, as branching from the Syadree, south of the Wurunda Ghaut. The advantages of

Note.—The distance from Mundur Dew to the sea, near Mhar, is about 30 miles as the crow flies.

the position of Mundur Dew, with reference to the sea at Mhar by

Wurunda Ghaut (a distance of about 50 miles by the made road from Rajawaree, and from Poona of only 36 or 37 miles) will be apparent, and seems to meet, in a higher degree than any other site yet selected, the requirements specified in the 33rd paragraph of Dr. Morehead's report

I shall have the honour to embody all the information I can give of the affair in the separate Memorandum and Sketch now under preparation.

above quoted. The whole hill belongs to the Waec districts, and is under the Collector of Sattara, who, no doubt, can give a better account of its soil than I can; but as far as my judgment goes, it has capabilities

equal to the beautifully-cultivated valleys and hills of the Bhore state, by which it is bounded on the west and north. Its water is good and *abundant* even at this season, and its climate, so far as coolness and healthiness are concerned, is not inferior to that of Mahableshwur itself, so far as I have been able to judge during my visits to it in April and May this year. I do not presume to put forth this opinion of the place as infallible in every particular; I merely state the impressions resulting from my own observation and experience of the

whole neighbourhood,—impressions that I honestly believe will be fully realised, should Government think it worth their while to put them to the test by experienced persons.

23. The trial-path from **A**, by Mundur Dew, to point **C**

	<i>M. f. yds.</i>
A to Rajawaree or point E . . .	7 4 8
E to F , a village of cowherds . . .	8 3 42
F to G , the top of the Ambur Khind . . .	3 4 145
G to C , in the valley near Yellung . . .	7 7 39

Total 27 3 14

measures by chain as per margin. I have not been able to complete it throughout for want of time, but merely in parts necessary to illustrate

and give access to the line I have chosen.

24. Were it constructed, the half-way point between Poona and Mahableshwur would be on one of the lower slopes of Mundur Dew instead of Sheerwul, or, if preferred, the halting place might be at the Ambur Khind, three or four miles further on, where the Punt Suchew is now building a dhurumsala and tanks for the use of travellers between Bhore and Wace, this being the direct and favourite pass used by all. The construction of the line **E**, **F**, **G** would unite Bhore with this Khind by a cart-road, and I could easily run a branch from it towards Wace into Captain Hart's line. There is a small bungalow and establishment of the Punt's at the Ambur Khind permanently resident there, and at Mundur Dew there is a tolerably-sized village. In fact I have now ascertained by actual survey what I could hardly have proved without it, viz. that the main subterraneous flow of water from the higher levels refuses the Koorul Khind route and supplies this one*

* Viz. the Ambur Khind and Mundur Dew line.

abundantly; hence this part of the hill is inhabited, and the other not. It will be observed also that the aspect of the branch

spur by which I run from Rajawaree at **E** to the Ambur Khind at **G** is westerly—an incalculable advantage, affording protection from the east wind in the cold season, and thoroughly exposed to the westerly sea breezes during the hot.

25. I would now submit a few remarks upon the best and shortest line of route from **A** to the bazaar flagstaff at Mahableshwur, or rather Malcolm Peth.

26. From Poona to **A** the Wace route and mine are identical; it

is unnecessary therefore to speak of that portion of the line in this report. From **A** to Malcolm Peth by Wace measures by the present track 50m. 6f., which, excepting between Wace bungalow and Paunchgunny, has not been scientifically laid out. The fair assumption therefore is, that were the whole line laid out as a cart-road, with a maximum slope of 1 in 17 (as mine has been), the 50m. 6f. (say 51 miles) above-mentioned would be at least 3 miles longer, or say in all 54 miles;

Wace route, from **A**, 54 miles, for it must be remembered that my measurement has gone *straight* over the Kamatkhee Ghaut, as my guide did not know the exact course of the new projected line in that part. I would now beg to place in comparison with the above my proposed line by the Ambur Khind from the same point **A** to the same point, the bazaar flagstaff at Malcolm Peth, measuring by the trial-path through all its windings a distance of 42m. 7f. 37yds., say 43 miles. The straightening of this path in construction will, at the lowest computation, reduce a mile, and there are many places where, for the sake of saving arable land and giving easy gradients, my curves

Ambur Khind route from A to the same point 41 miles, viz:—

Wace line 54

Ambur Khind . . . 41

Difference 13

* I believe that the whole distance from Poona to Mahableshwar could be reduced to 54 miles were 1 in 12 assumed as a maximum, but that would spoil everything in my opinion.

are longer than is consistent with actual directness; for these I might fairly allow a mile and more, so that, irrespective of all other advantages, the distance saved by the Ambur Khind will be thirteen miles, which, considering the easy slopes of my line, and the necessity of length* in order to obtain them, bears, I would respectfully submit, a strong contrast to the greater length of the Wace route. The old Sattara

and Neera route I do not touch upon, as quite out of the question in connection with the first subject under discussion.

27. In conclusion, I beg to submit that the total amount which I have expended since October last upon the whole survey and trial-paths for hired labour, gunpowder, and other materials is as follows:—

Amount received from Mr. Inverarity as a grant

from the Punt Suchew Rs. 1,500 0 0

Amount expended by myself in addition 3,147 9 4

Total . . . Rs. 4,647 9 4

28. I would only ask for reimbursement of my expenses in cutting these trial-paths, and making a difficult country roughly passable for palkees and horses, in case Government should entertain the idea that the work, as a whole, may either now or at no distant period prove useful to them. So far as I am personally concerned, it is part of a project which interested me some years ago, but which subsequent financial difficulties interrupted, as already explained. My own belief is, that the day will come, with the progressive advancement of this

* Viz. opening our communications with sanitary tracts of country possessing good agricultural capabilities.

presidency, when every yard of the Koorul Khind and Bhore, as well as the Ambur Khind lines, will be of use for one or both of the objects* I have stated, but whether the Government can think so or not, is a point that I deferentially submit for their consideration.

29. In order not to trespass upon your time and patience too much, I have endeavoured to confine myself, as much as possible, to an outline description of everything. Many points therefore are omitted that I would otherwise have touched upon. Much has been said by travellers, who used the Bhore trial-path, regarding the enormous expense of constructing such a line, and its dangerous character. I have much to say on both points, founded on a practical experience of some years standing on these matters, but it would be premature for me to enter into the details they involve until I ascertain whether Government is disposed to entertain any part of the project I have described. Suffice it to say that by the Ambur Khind a far cheaper and less dangerous road can be constructed than by the Koorul Khind. In point of danger, however, to wheeled vehicles on mountain lines with easy gradients, I can only say that having seen ponderous, heavily-laden diligences crossing the St. Gothard by the new line constructed some years ago through that pass, and having ascertained that the accidents they meet with are not out of the usual proportion, I should consider myself, comparatively speaking, safe in a phæton on an 18-feet wide road, protected in dangerous parts by a parapet wall, on either the Ambur Khind line or that up to Kate's Point from the Krishna valley.

30. A similar mode of reasoning would lead to the conclusion that ghaut lines of rail are liable to more accidents than those in the

plains, which I do not believe is borne out by experience as yet, even on the Trieste and Vienna line, where the Simmering incline works are on a scale not inferior to those of the Bhore Ghaut.

31. On the first introduction of our railways, the same reasoning gave rise to a popular belief that the accidents on them would, as a whole, exceed those met with under the old stage-coach system, and that a far greater loss of life in proportion would be the result; but I have been informed that such is not the case, though I cannot lay hold of the authority for it.

32. Be this as it may, you cannot get to Mahableschwur from Poona by any line without encountering ghauts, any part of which are precipitous enough in the cross slope to cause serious consequence, should accidents take place. Why therefore we should encounter a detour of thirteen miles, as well as the chances of cholera, without avoiding the danger of ghaut travelling, or securing any compensating advantage that can be named, is a course scarcely tenable, I would submit, when looked at in the general aspect which experience in this and other countries places before us.

33. With many apologies for trespassing so long upon your time and patience, as well as that of the Government.

I have the honout to be,

Sir,

Your most obedient Servant,

R. PHAYRE, Lieut. Colonel,

Quartermaster General.

Poona, Quartermaster General's Office, 11th June 1862.

Memorandum on MUNDUR DEW, with reference to Paragraph 22 of letter No. 985, dated 11th June 1862.

The accompanying sketch merely represents the upper Mundur Dew table; the spur of which it forms a part extends about fourteen miles westward to the Syadree, and twenty miles eastward to the Salpee Ghaut. I have had no opportunity of examining it in either direction except from a distance, but it appeared to me that its summit, for five or six miles either way from Mundur Dew presented a broad, flattish surface, composed of much the same kind of arable land as Mundur Dew itself. Indeed, from the manner in which the whole neighbourhood is already cultivated, coupled with an abundant supply of water (as yet turned to no account in the way of irrigation) I feel confident that every kind of tree, shrub, grain, or vegetable suited to the climate might be grown in great fertility. I however must confine the following remarks to the tract shown in the sketch, the upper

Soil. slopes of which are of red gravel, the rest a brownish mould, which is said to yield

very good crops of wheat, toor, tcil, and nachnee.

2. From the fact of good wheat crops being produced, I should infer that the rain-fall is as moderate as at

Climate.

Paunchgunny—a supposition which is strengthened by the position of Mundur Dew being further east than the latter. I can bear testimony myself to the delightful coolness of the climate in April and May last, until which months I never visited the place, but during which I never experienced a hot wind. Indeed, Mundur Dew was described to me as bearing a strong contrast in this respect to Poorundhur, by a friend who rode across from the one to the other, for a visit of a day, and returned by the same route. This may be easily accounted for by the relative position of the two places as regards the sea coast, Poorundhur being about 65 miles distant from it as the crow flies; the intermediate country being swept by fierce hot winds from March to June; and Mundur Dew being about 50, with a wild and lofty ghaut country in its immediate front, that has a cooling and refreshing influence on the sea breeze as it sweeps over it.

3. The village of Mundur Dew consists of 79 houses, inhabited by Marathas, all of them farmers. There is a second village, of some 15 or 20 cowherds' huts, about two miles further down the spur, in the Poona direction, on the proposed line of road. Judging from the repugnance to hill sites that natives generally have, there must be no slight attraction, I should think, to induce the description and number who inhabit Mundur Dew to select it as a residence. They say that the whole hill is very healthy, and that a case of cholera has never been known on it.

4. The water is abundant and very good, especially at the Ambur Khind, where the Bhore chief is building tanks for the use of travellers. A small tiled-bungalow, inhabited by Brahmins, is already erected there, and a dhurumsala is in course of construction. The height, from which there is a perennial flow in several places, considerably enhances the value of such land as can be irrigated by it at any season.

5. The highest point on Mundur Dew is occupied by a temple, to which pilgrims from the plains constantly resort. An annual fair is held in the vicinity of this temple during January and February, which lasts some days.

6. I could not depend upon the aneroid which I procured from Poona for taking the exact height of the table, but by comparing my observations with known heights at Mahabaleshwur, it would appear to be about 4,000 feet above the sea, or rather more, and the temple hill between one and two hundred feet higher. The plateau generally commands one of the finest panoramic views I have seen in the hills, and embraces Poorundhur, Singhur, Rajghur, Torna, Mahabaleshwur, and eastwards into the black-soil plains watered by the Krishna and Bheema as far as the eye can reach.

7. Without fear of exaggeration I can affirm that, during all my wanderings through these beautiful hills, I have seen no place after Mahabaleshwur so well suited for a sanitarium as the neighbourhood I have attempted thus briefly to describe. I ascribe this superiority solely to the fact of its combining the qualifications indispensable to a good and useful sanitarium, such as a healthy climate, a good geographical position, and the means of cultivating in a high degree

trees, shrubs, flowers, vegetables, or grain, so that neither visitors nor settlers would ever be without ample means of recreative and useful employment.

8. Coffee would, I am sure, from my own experience, flourish in properly selected spots; but I am most anxious to ascertain whether tea could not be introduced as successfully here as it has been in Upper India. Nearer the plains, in the Poona direction, the hill sides abound here and there with jungle teak, which I am informed realises, in the form of rafters, a good price in the Poona market; and should this prove correct, there is no reason why the plantations should not be multiplied a thousand-fold along the continuation of the same slopes which are at present lying waste. Blackwood, jackwood, and other forest trees would, I know, grow in certain protected sites.

R. PHAYRE, Lieut. Colonel,

Poona, 17th June 1862.

Quartermaster General.

*Minute by His EXCELLENCY SIR W. R. MANSFIELD, K.C.B.,
dated 13th June 1862.*

The Quartermaster General having had the goodness to show me his letter, dated the 11th June 1862, on the selection of new sites and lines of communication on the spurs of the Syadree range, before forwarding it to the Revenue Commissioner for the Southern Division, I have much satisfaction in recommending it to the consideration of His Excellency the Governor in Council. Being aware that sanction has been given to the improvement of the line running through Waee and over the Kamatkhee Ghaut, I believe it may be agreeable to His Excellency the Governor to have this paper before him as early as possible; in short, before execution is given to any of the works now in contemplation.

2. I have no personal knowledge of the *Ambur Khind line by Mundur Dew, but according to Lieutenant Colonel Phayre's account, it seems to unite many advantages not possessed by any other. The

shortened distance has, of course, an importance ; but its great merit is, that it opens out a new plateau for European occupation, whether of troops or settlers, the attributes of which apparently much exceed those of Paunchgunny. With the success of the latter we are well acquainted. It is but fair to consider that success is an admirably practical argument in favour of Lieutenant Colonel Phayre's views and prospects, to whose other statement it is impossible for me to make any addition.

3. I would ask leave to mention that I have travelled by the line from Bhore to Malcolm Peth *viâ* the Koorul Khind, Yellor, &c. It is admirably laid out. As shown by Lieutenant Colonel Phayre, it is at present but a trial-path, and as such must try the nerves of travellers unaccustomed to such paths over mountains ; yet we have in it the first elements of a good wheeled-carriage road, as regards gradients, &c. But the road has to be constructed—a fact, perhaps, overlooked by many of the travellers who have made their journey by it.

RESOLUTION OF GOVERNMENT.

The thanks of Government are due, and should be conveyed, to Colonel Phayre, for this very valuable addition to our knowledge of the sanitary sites in this part of the Deccan, and of the best means of getting at them.

2. The Governor in Council would not consider the lines Colonel Phayre has surveyed as alternatives for the line lately sanctioned from Poona to Sattara, *viâ* Sheerwul and the Kamatkhee Ghaut, because the latter must, under any circumstances, be the shortest and easiest,—crossing the Mundur Dew and Kamatkhee range at its lowest and easiest point, and, except at that point, keeping well in the plain away from all ranges and spurs which, by the Ambur and Koorul Khinds must be crossed or turned, involving a considerable extent of hill-side cutting.

3. The Sheerwul and Kamatkhee line is moreover, as observed by the Revenue Commissioner, the best for the commerce and agri-

culture of our own districts on and near the line, and any attempt to find one line which shall serve two purposes is likely to end, it is feared, in our getting a line which is not the best for either purpose singly.

4. The Governor in Council would therefore let the sanctioned works on the direct Sattara line proceed without special reference to Colonel Phayre's propositions.

5. The objects he proposes are important enough to justify the necessary expenditure on their own account.

6. The expenditure incurred should be repaid by Government, including the sum advanced by the Punt Suchew.

7. The cost of completing the lines selected by Colonel Phayre, and converting them into good cart-tracks, should be carefully and thoroughly estimated, both with a view to securing the best and shortest line to Mahableshwur, and also of getting easy access to Mundur Dew.

8. This should be done by the Public Works Department, and at the public expense, but under the general supervision of Colonel Phayre. Colonel Phayre should be requested to confer with the Superintending Engineer, and inform Government how they think this can best be done.

9. Accurate observations should be taken as to rain-fall, range of thermometer, &c. This, no doubt, can be easily arranged, if Colonel Phayre will confer with the Deputy Inspector General of Hospitals, and report what sanction is required for taking such observations. It is probably not too late to arrange for them for a portion of this present monsoon.

10. All the spurs round Mundur Dew should be examined, in order to decide on the best line of access for carts. The range running on towards Kamatkhee should, in particular, be examined with this view.

11. The Revenue Commissioner should be requested to call for remarks and suggestions from the Collector of Sattara.

12. Colonel Phayre's reports, with the maps, should be printed and made available to the public as a volume of Government selections.

13. This is likely to do more than anything else to promote his object, as calculated to induce some one to do for Mundur Dew what Mr. Chesson has done for Paunchgunny—by taking up his quarters there, conciliating the people by making their interests identical with his own, and by getting others to join him in this useful work.

14. There is room, and more than room, for all, and we shall need all the localities indicated by Colonel Phayre besides Paunchgunny and Mundur Dew. In thanking him for his valuable labours in this direction, the hope of Government should be expressed that Colonel Phayre will prosecute them as far as his other duties may admit, and from time to time favour Government with any suggestions which may occur to him calculated to promote the object in view.

15. As soon as these papers are printed, copies of them should be sent to Dr. Morehead.

WALTER SCOTT, Major General,

Secretary to Government.

Bombay Castle, August 1862.

**SELECTIONS FROM THE RECORDS OF THE BOMBAY
GOVERNMENT.**

No. LXVIII.—NEW SERIES.

R E P O R T

ON

PROJECT FOR RECLAIMING LAND

BETWEEN

BOMBAY AND TROMBAY,

BY

**LIEUTENANT W. M. DUCAT,
ACTING EXECUTIVE ENGINEER, NORTHERN CONCAN DISTRICTS,**

WITH A

M E M O R A N D U M,

BY

**LIEUTENANT-COLONEL A. DELISLE,
CONSULTING ENGINEER FOR RECLAMATIONS**

WITH THREE PLANS.

Bombay:

PRINTED FOR GOVERNMENT

AT THE EDUCATION SOCIETY'S PRESS, BYCULLA.

1863.

REPORT

ON

PROJECT FOR RECLAIMING LAND

BETWEEN

BOMBAY AND TROMBAY.



HAVING been employed in the Bombay harbour for about three years under Captain (now Lieutenant Colonel) DeLisle, first on the survey and preparation of the Honorable A. Malet's reclamation scheme (now being executed by the Elphinstone Land Company), and afterwards on the defences of the Bombay harbour under the same officer, I have had many opportunities of observing the feature of the harbour, and among other points of remarking the quantity of silt deposited all along the Mazagon shore. The silting being evident, the next step is to trace the cause, and no great difficulty is experienced here in this case, as it becomes at once apparent to any one possessing the slightest knowledge of engineering, and having an opportunity of inspecting the land about the north of Trombay, that the cause may be traced to the construction of the causeway between Sion and Trombay, which interferes with the scour formerly existing round the latter island. On each side of this causeway a mud deposit has been formed, which is now in parts almost, if not entirely, free from the influence of the sea water. This deposit is annually on the increase, and will doubtless ultimately reach a limit between Peer Pan point and Mazagon, where, owing to the wash of the tide round the former point, no further tendency to silting will exist.

2. It is on this line then that I propose to construct a sea-wall of dressed stone to act as a bunder face, and behind which the deposit of silt will form a plain, which will, when fit for building purposes, be as valuable as almost any part of Bombay at present.

3. The want of space in Bombay to meet the greatly increasing commerce of the port has for a long time been very much

The direct advantages to be derived from it. felt, and is likely to increase rather than de-

crease as Indian cotton rises in value and

Bombay becomes, as it is gradually becoming, the commercial capital of British India. This reclamation will give about 17½ millions of square yards for building purposes, roads, &c., and about 3½ miles of wharfage. A large road might be opened through Mazagon, connecting this new town with the Elphinstone Land Company's reclamation, the proposed new Great Indian Peninsula Railway goods terminus, and in fact with the very centre of the commerce of the present town. A branch railway should be run from Coorla station through the centre of the new town down close to the wharf where large cotton storage grounds could be laid out. These, with properly laid-out roads throughout the new town itself, would at once establish its position and value, and no more would be heard for some years to come of the want of accommodation in Bombay.

4. The indirect advantages of the scheme are likewise of great importance.

The contingent advantages In the opinion of Dr. Leith, one of the ablest and most experienced medical officers in the

service, expressed in his valuable report on the sanitary condition of Bombay, the existence of these marsh lands so near the town is most injurious, and the malaria arising from them should, if possible, be remedied. This would be one real benefit conferred on Bombay by this reclamation. At present the beautiful hill in the island of Trombay is so unhealthy as to be quite useless as a place of residence for either Europeans or natives, and is therefore left a mere jungle. This reclamation would turn this hill into a second Malabar Hill, and its value would be calculated by the square yard, instead of the acre as at present. To those conversant with Bombay the advantages to be derived from increased space for building houses for residence will not appear among the least of the recommendations to this reclamation when the present rate of house-rent on Malabar Hill is borne in mind. Its effect on Chinch-pooglee hill would also be most beneficial.

5. I have purposely omitted its anticipated effect on the harbour for reasons which will be stated hereafter.

6. No surveys or estimates for the scheme having been prepared, I have
 Probable cost. been obliged to take my measurements from

the chart of the harbour, which being on a small scale cannot of course be depended on for any very great accuracy, but will nevertheless serve to give a rough idea of the cost likely to be incurred, and the returns which may be expected for the outlay. The length of the sea-wall I calculate to be about 6,600 yards, and I have assumed the probable cost per yard, including filling with earth for a width of 20 feet, to be about Rs. 630 on an average, or say 42 lakhs for the whole length. Allow in addition 3 lakhs for contingencies, and we have an outside total of 45 lakhs of rupees. As regards compensation due to owners of land bordering the reclamation for interfering with existing rights I have no means of calculating the amount, but as most of the sea-front is at present useless on account of the mud deposited along it I have assumed 15 lakhs as a round sum.

7. To complete the project a main-drain on the site of the present creek, running up the centre of the marsh, should be converted into an arched-drain to carry off the surface drainage, and act as the main artery for a complete system of sewerage hereafter. I have estimated this roughly and consider that as much as 16 lakhs should be allowed for it.

8. In addition to the above we want the main roads laid out in the first instance to induce people to come to the new town. These roads I consider could be executed for Rs. 7,500 per mile, or say 3 lakhs for the total of roads.

9. These different items totalled up give us as follows :—

	Lakhs.
Sea-wall and filling	45
Compensation	15
Main-drain archwork	16
Main roads.....	3
	<hr/>
Total....	Lakhs 79

Amount of above in ten years at 5 per cent. about 125 lakhs.

10. In estimating the value of the sea frontage and most eligible building sites I have taken Rs. 20 per yard as the
 Probable return. highest price, which is about one-fifth of the present price of similar sites in Bombay, old town, and fort. At this rate, which is, I think, very low, a sum of about 65 lakhs would be the value of

the bank-face which I have assumed to be fifty yards wide. Next we have 1 crore of rupees to be realised by the sale of the first row for warehouse buildings facing the wharf, and extending back for 100 yards in depth, sell this 1 crore, which will leave a margin of nearly 30 per cent. for roads, &c. Assuming one-half this rate, or Rs. 10 a yard, for the remainder of the first quarter of a mile from the sea-face, we get about 1½ crore more. This leaves about 14½ millions of yards to be disposed of. Of this say we omit the 4½ millions, or nearly 50 per cent., for roads and other public purposes, and assume 4 annas a yard as a value for the remaining 10 millions of yards, this gives us 25 lakhs more; so that the grand total will stand thus—

	Lakhs.
Sea-front	65
1st class building-plots.....	100
2nd do. do.	150
3rd do. do.	25
<hr/>	
Total....	Lakhs 340

11. In stating the probable cost of the scheme I have taken the whole amount at 5 per cent. per annum, as I consider it better in the first instance to have the outside expenditure clearly borne in mind so that no disappointment may be felt hereafter. But in executing the work I consider that if well managed a sum of 50 lakhs would probably be the largest outlay necessary, and the returns from the land reclaimed for this sum be used to complete the project. In this way, although 80 lakhs will be necessary to complete the work and realise all its advantages, a capital of 50 lakhs will be sufficient to work it with. In carrying out the project I would propose at once to fill in the earthen embankment from both ends, viz Mazagon and Trombay, leaving of course a large gap in the centre for the silting to go on, in order that the silting-up which will take a considerable time may commence as soon as possible; but the face-wall should be carried out from Mazagon only. After 10 lakhs have been expended on the sea-wall, I am of opinion that a return might be expected from that portion of the work adjoining Mazagon, which return will increase annually and most rapidly as the scheme approaches completion. The faster the work can be pushed on after it is once commenced the greater will be the return from it, as all its advantages cannot be realised until the work is complete. I do not think that any

The method proposed for realising at first

one knowing the rising importance of Bombay and its daily increasing requirements would entertain any doubts as to the realisation at once of at least the two first items, namely, bunder-face and warehouse-room, and of the third item also in the course of a few years. The sea-frontage will be superior to that of any existing bunder in Bombay, having in places as much as three or four feet at low spring-tides, and the rate assumed for it is only Rs. 20 per yard; whereas Carnac Bunder and others which are quite dry at ordinary low tides stand at a value of about Rs. 120 per yard, or six times as high as the price I have put down. At these and even far high rates purchasers would not be wanting.

12. At first sight the project seems to offer too great advantages, and altogether to have too much the appearance of a bubble-scheme, and it was to obviate this as far as possible that I reduced my rate for bunder and first-class building-plots from Rs. 50, my first valuation, to Rs. 20 per yard. But when it is remembered that from the position of the sea-wall almost all outlay on "filling in" (which in these schemes is always the most important item) is obviated, the land reclaiming itself by silting up, and that a reclamation scheme, where this heavy expense has to be incurred, is nevertheless considered of a sufficiently remunerative character to be undertaken by a company of merchants in Bombay under the title of the "Elphinstone Land Company." When, I say, all this is fairly taken into account, the return, though calculated at nearly 300 per cent., does not appear so impossible.

13. In a previous section of this report I stated that "I purposely omitted to mention the anticipated effects of this Engineering difficulties. reclamation on the harbour for reasons to be stated hereafter." It is of this subject that I now wish to treat here.

14. As regards the construction of the work up to this point no great difference of opinion can exist as to the possibility of overcoming all the engineering difficulties, the only doubtful point being the length of time required and the amount of artificial assistance necessary to fill in the reclamation with silt. But another question has to be mooted, the answer to which is not so easy, and the importance of which is so great as to make it in my opinion the turning point of the entire project. This question is, what effect will this reclamation have on the harbour?

15. To understand the few following remarks on this subject it will be necessary to refer to the accompanying sketch.

16. As a general rule the destruction of any backwater in a harbour is an error from which a tendency to silt is likely to result. This error was undoubtedly committed when the Sion and Trombay causeway was constructed, and all the backwater from the north of Trombay shut out from the general scour. This error being acknowledged (it is evident to anyone seeing the amount of mud deposited now), it at once becomes the duty of Government to rectify it in the best way they can before matters get worse. Two methods present themselves :—

First.—The channel might be reopened and the causeway carried over a bridge. This would ensure the scour, but would cost a considerable sum of money in bridges and cutting, which latter item will in a few years hence be much more heavy than it would be now, and consequently no time should be lost in ascertaining whether it will ultimately be necessary or not. Of course no money return will be derived from this.

Secondly.—The sea-wall that I propose might be built as shown in the drawing, with the view of inducing the backwater scour from Panwell river and the Tanna creek to follow the line of the wall round the south point of Trombay island. The only question to be decided is, will the current follow the wall, or will it not? If the answer is, yes it will, the project should be carried out at once, not only as a paying scheme, adding very much to the importance of Bombay, but as a very necessary measure for the protection of the harbour itself. I consider that this wall if properly laid out will have this desired effect. The present flow of the current is, I believe, from Trombay point to some point near Cross Island on the east side; but the return of a large body of water like that from the site of the proposed reclamation, no matter how small its velocity, must have some influence in keeping the current away from the Mazagon shore; so that in its present state I consider the bay proposed to be reclaimed useless as a backwater (being too small to effect an efficient scour), and detrimental in excluding from the Mazagon shore the scour from the head of the harbour.

17. As just now the project for reclaiming Back Bay has been revived

Value of this scheme compared
with Back Bay scheme and others.

and is a good deal talked of, I will make a few remarks on the relative advantages of the two.

18. To begin with the face-wall. That of Back Bay if built of cut-stone will be a most costly undertaking, being required to resist the full force of the monsoon; and the annual cost of repairs will be a heavy item. This wall will be unsafe for any boat to moor alongside of except during the very calmest weather. If constructed of loose stones only, no boats can lie off it at all. The sea-wall in this project being at the most sheltered spot in the inner harbour, need be little more than an ordinary retaining-wall, and can be used at all seasons of the year, even during the monsoon if necessary; and from its face a pier can be built out hereafter, when funds are available, alongside of which the Peninsular and Oriental Company's steamers, or any vessel not drawing more than 20 feet of water, could lie.

19. In the next item ("filling in") Back Bay scheme is also at a disadvantage. The only means of filling in Back Bay would be by the Bombay, Baroda, and Central India Railway; and the nearest point from which to obtain ballast would be Salsette, which is all private property, and would have to be bought in the first instance, and carried such a distance afterwards as to make the cost of the filling-in alone (excluding the expenses of the face-wall) more than the value even in Bombay of the land when reclaimed. The advantages of this scheme have been already mentioned.

20. The value of the land in Back Bay would not be very great per yard: having no sea frontage the greater portion would be similar to land at Girgaum and Tardeo; that near the Fort and Colaba would of course realise large sums.

21. Its contingent advantages are none, but its effects on Bombay might be injurious. The wisdom of allowing the sea breeze into the Fort to be filtered through a mile or more of town before reaching its destination is very questionable, and its probable effect on the health of Bombay generally should be well considered. In this item, as in most others, the scheme forming the subject of this report has a most decided advantage.

22. In the above remarks as much has been said about this project I

Concluding remarks.

think as can be safely assumed with the data we at present possess, but seeing the probable results promised by this reclamation, I hope to see more accurate surveys and estimate called for and prepared. I commenced the preparation of this report because I foresaw some of the advantages to be derived from the scheme, but the roughly-calculated results far exceed my most sanguine expectations.

23. Nothing further can of course be done in the matter until a more accurate estimate is obtained ; but as the cost of the survey is comparatively speaking very small, I trust His Excellency Sir Bartle Frere will consider it advisable to have the scheme properly prepared. The necessary capital of 50 lakhs though large might be easily obtained if Government felt sure of a return ; and if Government are unwilling to undertake the risk themselves, I have no doubt a Company would be formed either in Bombay or London who would willingly take up the scheme if submitted to them in an intelligible form. An officer might be appointed to survey and design the entire project in a sufficiently clear manner to enable any engineer to judge of the difficulties of the undertaking, and to give a professional opinion to any Company in London who might intend to speculate in land of this description. To give an idea of the value of the land when reclaimed the opinion of the Collector of Bombay and Tanna might be obtained, and perhaps at the request of Government the Chamber of Commerce might be induced to aid in forming a valuation. These two points (the cost and return) being settled by competent persons on the spot, sufficient data would be furnished to speculators at home to enable them to judge of the merits of the scheme.

24. As regards the probable effects on the harbour, a committee of engineers might be formed in Bombay to whom the question might be referred, or if Government preferred it, a plan of the harbour, showing the currents, &c., could be sent home, and the opinion of one of the first consulting engineers of the day be obtained.

25. Were these precautionary measures adopted no undue risk would be incurred by anyone undertaking the project, and the importance of Bombay as a commercial town would be very much increased.

WALTER M. DUCAT,

Acting Executive Engineer,
Northern Concan Districts.

No. 4 OF 1862.

PUBLIC WORKS DEPARTMENT.

Memorandum on the Project of LIEUTENANT W. M. DUCAT, R.E.,
for Reclaiming the Land between Bombay and Trombay.

For the sake of convenience the subjects will be taken in the same order as in Lieutenant Ducat's paper.

2. The cause of the present silting-up of this space is no doubt owing to the obstruction caused by the roadway from Koorla to Trombay. Only one archway has been allowed, probably for the purpose of allowing surface and tidal waters to escape.

3. There is, however, still a sufficient body of water at high-tide to afford an ebb-current of considerable power between Green Island and the Bombay coast line, and many years will yet elapse before the silting will have progressed so far as to render this current too feeble to prevent the silt extending along the fore-shore of Mazagon.

4. It is scarcely necessary to discuss the direct and contingent advantages Lieutenant Ducat states as likely to be obtained by this reclamation further than to mention that land in this locality is still too remote from the centre of trade to be as valuable as he supposes. Even at Mazagon land now sells at Rs. 4 to Rs. 6 per square yard if in a good situation, and is not worth more than Rs. 2 if off the roads.

5. It is probable that the extensive reclamation between Mazagon and the Castle will meet all the demands for space in Bombay for some years to come.

6. In estimating the probable cost of the sea-wall Lieutenant Ducat has taken the sea-wall and earth-filling for 20 yards behind it; but I do not see that he has anywhere estimated the expense of raising the general level to a certain height above high-water mark. This would require to be raised at least a yard and a half ($4\frac{1}{2}$ feet).

7. The mere silting-up would not be sufficient for building-grounds, for which purpose the surface must be raised to give a sufficient slope for drainage and to keep the buildings dry. Assuming the surface to be 16 millions of square yards, the quantity of filling required in addition to silt would be 24

millions of cubic yards, which, at 12 annas per yard, would cost 180 lakhs, and I need hardly say there would be some difficulty in procuring this enormous quantity of material.

8. The sea-frontage of the new sea-wall is exposed to the direct action of the waves in the monsoon. This would render extensive boat-harbours necessary to allow of the bay being used as a wharf, and of course increase the expense.

9. On the other hand the land along the wharves would not be so valuable to the mercantile public as ground nearer to the Fort. A merchant would not willingly lose a good portion of his day's work in going there to inspect a parcel of cotton; and even the Railway would hardly prove a remedy to this evil unless there were half-hour or hourly trains either way. I much doubt if this land would realise the prices assumed by Lieutenant Ducat, considering how large a space is yet available in the Bombay flats with the convenience of two main lines of railway passing through them.

10. The main objection to the project lies, I think, in the probable effect it would have on the harbour.

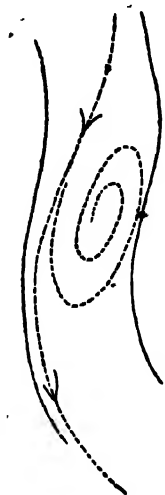
11. I have attached two tracings, one marked A, showing the direction of the present tidal currents in the harbour at ebb. It will be seen that the edge of the main current from Pan Pir Point in Trombay strikes outside Cross Island, and that the space between it and the coast of Bombay is filled up by the current from the bay between Bombay and Trombay. A minor current runs along the south face of Trombay as far as Green Island, where it meets the southward current and is deflected.

12. Now if the space between Bombay and Trombay be filled up two things may happen. *First*, The minor current may continue its flow along the new sea-wall to Mazagon and then along the sea-wall of the new reclamation; or *Secondly*, The main current may overpower the minor one and cause an eddy in the curve as sketched in the second tracing B. That it does not do so now is, I think, owing to the influence of the ebb from the body of water now existing in the backwater between Bombay and Trombay.

13. In the first case, which is the most favourable, and is that which Lieutenant Ducat anticipates, the current will be slower than the main current, and therefore likely to cause a deposit of silt along the new sea-wall and the Mazagon bunders as far as some point opposite Chinch Bunder.

14. In the second, which seems to be the more likely one to happen, the eddy will cause a considerable amount of deposit and render a great deal of dredging necessary to keep the wharves clear.

15. This might, perhaps, be obviated by a rough stone-groin from Butcher's Island to the reef, as indicated by a red line. This would tend to deflect the main current against the Bombay shore.



16. I give this opinion with much diffidence as there is always great uncertainty in determining the probable courses that water may follow. We know, however, that in rivers such as the Indus when the main current shoots across the river there is generally an in-shore eddy as sketched in the margin, and a clever commander takes advantage of this to hasten his voyage up the river.

17. On the whole I am of opinion that this reclamation would not be desirable if carried out in the mode proposed by Lieutenant Ducat.

18. The portions in the higher part of the backwater, which are only covered by two or three feet of water at spring-tides, might of course be reclaimed without doing much injury, and for this simple earthen embankments would probably be sufficient; but so far from reclaiming the remainder I would recommend that it be dredged to furnish material for the reclamation now in progress. Every encouragement should be given to parties requiring material to procure it from this space.

19. A central channel should of course be preserved in the embanked portion to carry off surface-drainage.

20. Lieutenant Ducat gave me such able and willing assistance while employed under me in Bombay that it is with much regret I find myself compelled to give an unfavourable opinion on his project.

A. DELISLE, Lieutenant Colonel,

Consulting Engineer for Reclamations.

Bombay, 16th December 1862.

RESOLUTION of GOVERNMENT, dated the 15th January 1863.

A copy of Lieutenant-Colonel DeLisle's report should be forwarded to Lieutenant Ducat.

2. Government are of opinion that Lieutenant-Colonel DeLisle's report is conclusive against agitating the question further.

3. But the reports of both Lieutenant-Colonel DeLisle and Lieutenant Ducat contain much which is incidentally valuable about the head of the harbour, and should be printed with plans in a volume of selections from the records of the Public Works Department.

**SELECTIONS FROM THE RECORDS OF THE BOMBAY
GOVERNMENT.**

No. LXIX.—NEW SERIES.

P A P E R S

RELATING TO

CANAL IRRIGATION IN SIND,

WITH

SUGGESTIONS FOR ITS IMPROVEMENT.


WITH SEVEN PLANS.


Bombay:

PRINTED FOR GOVERNMENT
AT THE EDUCATION SOCIETY'S PRESS, BYCULLA.

1863.

No. 125 OF 1861.

*Agricultural.
Irrigation.*

PUBLIC WORKS DEPARTMENT.

From J. D. INVERARITY, Esq.,
Commissioner in Sind,

To His Excellency the Honourable Sir G. R. CLERK, K.C.B.,
Governor and President in Council, Bombay.

HONOURABLE SIR,

In his letter No. 71 of 26th February 1859 Sir Bartle Frere submitted proposals for the systematic Canalisation of Sind. He gave a list of seven great Irrigational works which he considered possible in this province and not too expensive to be undertaken out of its current revenues.

2. Of these works the construction of the Mitrow Canal has already been sanctioned by the Indian and Home Governments, and a project for a perennial navigable canal from Roree to the Fullailee for the irrigation of the Hyderabad districts has been favourably received by Government and the Home authorities.

3. A third scheme proposed by Sir. B. Frere was that of a great canal

1. From Mr. Price, Executive Engineer, to Superintendent of Canals, No. 29, dated 11th October 1859.

2. From Superintendent of Canals to Chief Engineer in Sind, No. 1238, dated 7th November 1859.

3. From Chief Engineer in Sind to Commissioner, No. 246, dated 4th February 1860.

4. From Chief Engineer in Sind to Commissioner, No. 1268, dated 21st May 1860, with accompaniment.

5. From Collector of Shikarpoor to Commissioner, No. 101, dated 16th April 1860, with accompaniment.

with a head at Sukkur and a course not far distant from that of the Indus, and calculated to give a cheap and abundant, possibly a perennial, supply of water to the districts on the right bank of the river between Sukkur and Sehwan. The papers enumerated in the margin and herewith submitted relate to this perennial canal, which commenced on a comparatively small scale, will afford valuable data for guidance, and furnish the first section

as it were of greater works of improvement to be hereafter carried out.

4. At its head, where the discharge will be 400 cubic feet of water per second, the canal will be 35 feet wide at bottom, with a depth of water of 6 feet. For 19 miles are these dimensions maintained ; thereafter they are reduced,

as circumstances require, until the limit of the canal (63 miles) is attained at Shadadpoor, where the bottom width becomes 16½ feet and the depth 3 feet. The total cost of canal, with its regulating-bridge, lock-channel, &c., is estimated at Rs. 7,29,820.

5. The direction of the canal since first indicated by Captain Fife and Sir Bartle Frere has been somewhat modified and carried to the westward in consequence of the more favourable slope of the country and the urgent want of water for irrigation in that direction. The details of the plan as given by Mr. Price, the Executive Engineer who surveyed the country, &c., meet with Captain Fife's entire approval; and although Colonel Turner's views on a few points were at first adverse, he, on further consideration, modifies the objections he had expressed, which he states need not interfere with the commencement of the work proposed.

6. In the first 30 miles there are 18 existing canals crossed by the new line, and a portion of the country is at times liable to overflow; but these difficulties are described as capable of being easily dealt with, and the absence of any engineering difficulty of magnitude favours the formation of the proposed canal at a moderate expense. The maintenance of the cultivation on the Muksoodeh and Shajeekoor canals above the points of their intersection with the projected work must be provided for.

7. It will not be possible to avoid altogether the deposit of silt with which the waters of the Indus are so largely charged; but this inevitable contingency must always be more than balanced by the continued supply of water in the proposed canal for more than double the period it is now furnished by the common inundation canals of the country.

8. The revenue aspect of the subject may be seen from the reports of the Collector and his Deputy herewith submitted. The former has little doubt that the canal will prove a most remunerative work to Government, and the latter shows that at the low rates he proposes 82,000 beegahs of lands now waste will yield a revenue of Rs. 61,500, and the yearly cultivation of lands which now require two years' fallow will yield a revenue of Rs. 83,000; thus the annual return from the canal is estimated at Rs. 1,44,500, and allowing Rs. 34,915 for the cost of maintenance, the net return to Government will be Rs. 1,09,585, or about 15 per cent. on the proposed outlay of Rs. 6,98,306, exclusive of cost of lock-channel at head of canal. Captain Fife estimates the probable return at 25 per cent. which is far too high an estimate. I agree with the Collector and his Deputy in the policy of placing a light assessment on the land at first, because much expense is incurred by the cultivator in bringing waste and fallow into a state of cultivation.

9. An impediment to the present project would have been the boat-canal proposed in Mr. Secretary Hart's letter to the Secretary to the Government of

India, No. 1040, dated 15th April 1857, for the purpose of avoiding a dangerous rapid which obstructs the River Indus between Sukkur and Bukkur. This boat-canal though recommended appears never to have been sanctioned; and the Superintendent of Canals, Captain Fife, in his letter No. 1256, dated 10th November 1859, substitutes as a preferable project a plan and estimate for Rs. 2,05,984 for enlarging the right channel of the Indus at Sukkur, thereby reducing the velocity of the current and facilitating the passage of boats and steamers past the rapids at that place.

10. These projects being intimately connected with the irrigational project under review, inasmuch as the latter could not be carried out were the approved plan of the boat-canal adhered to, I requested the Chief Engineer, Colonel Turner, to favour me with his opinion on Captain Fife's last project for improving the navigation of the Indus by widening the channel between Sukkur and Bukkur.

11. That officer's report (No. 1069, dated 27th instant), with its accompaniments, is appended, and it will thence be seen that Colonel Turner is of opinion that the widening of the channel between Sukkur and Bukkur will not materially interfere with or injure the cultivation dependent upon the canals that leave the river immediately above Sukkur.

12. There are thus two projects now submitted for the consideration of Government :—

1st.—The improvement of the channel of the Indus at Sukkur by removal of a portion of its right bank, Chief Engineer Colonel Hart's letter No. 2652, dated 18th November 1859, so as by reducing the velocity of the current to facilitate the passage of boats and steamers. The estimated cost of this project is Rs. 2,05,984.

2nd.—The formation of a perennial canal from Sukkur to Shadadpoor at an estimated cost of Rs. 7,29,820.

13. Both projects I recommend to the favourable consideration of Government on the grounds of their utility and of the profit that is likely to result from their execution. Should the present state of the finances interfere with the immediate prosecution of either work, I would still recommend that a formal sanction be accorded to them, the execution of them being reserved until funds become available.

I have the honour to be, &c.

J. D. INVERARITY,

Commissioner in Sind.

Kurrachee, Commissioner's Office, 30th April 1861.

No. 29 OF 1859.

From Mr. W. H. PRICE, C. E.,

2nd Executive Engineer, Canal Department,

To Captain J. G. FIFE,

Superintendent of Canals in Sind.

SIR,—I have the honour to submit herewith plans Nos. 1 to 7 (together with an Index Map attached to this report) and an estimate amounting to Rs. 7,29,820 for a canal of perennial irrigation, to extend from the Indus at Sukkur in a direction generally westward for a length of sixty-three miles, and terminating at Shadadpoor, a project of which I undertook the preparation in accordance with the instructions conveyed by your letter noted in the margin

No. 1077, dated 15th December 1858. which directed me to “undertake a survey for a perennial canal from the rocky bank of the Indus at Sukkur to irrigate the country south-west of that place.”

2. These instructions you subsequently modified, as the survey proceeded, with reference to the direction, the levels having shown that though the features of the country are by no means such as to preclude the formation of a canal in the line at first indicated, yet the most favourable slope is to be found to the westward, while at the same time it is in the latter direction that the want of water for irrigation is most urgently felt. Thus it became apparent that the views set forth in the 3rd paragraph of your instructions would be most fully met by the modified line, as requiring moderate outlay, and being capable of speedy execution and of subsequent extension and enlargement when required.

3. It will be also perceived that the canal now proposed will for the first eighteen miles of its course be identical in line with that which should be adopted for the trunk canal to the south-west, so that the execution of the former will not be an impediment to that of the latter should it hereafter be determined on, but will rather facilitate such an undertaking, as the smaller canal might easily be widened to the desired extent from its head to the point of divergence (requiring a very small outlay for enlargement of subsidiary works) and thence onwards would become one of the branches of the trunk line.

4. Having so far endeavoured to state the considerations generally which led to the modification of line, I shall proceed to described the results of

the survey, the existing canals crossed, and the nature of the country traversed. I shall next refer to the course proposed for the canal, its general arrangements as to dimensions, expenditure of water, slopes, velocities, and subsidiary works, and the manner in which it is intended to deal with the existing canals. Next I shall advert to the subsidiary works in the order in which they occur in the estimate, with the view of offering any explanation which may be required as to their designs and cost, but without going into details as to their construction, which will be found fully described in the estimate under the proper heads. I shall afterwards state the probable return which may be expected on the proposed outlay, and the time within which it is likely that the works may be completed; and shall in conclusion notice any other matters which may present themselves for consideration in connection with the project.

SURVEY, EXISTING CANALS CROSSED, AND NATURE OF COUNTRY.

5. The lines of levels taken are shown on plan No. 1, which consists of a map of the country traversed, drawn to a scale of half an inch to one mile. On this map, as on that of the Roree and Hyderabad canal project, the level of only every fourth station is shown as a greater number of figures could not be written on it with distinctness. A larger map has been prepared on a scale of one inch to a mile, showing the level of every station, and this is retained for the use of the officer who may be engaged in the execution of the works.

6. It will be observed on reference to the map that a considerable transverse-slope exists on the right bank of the Indus immediately below Sukkur from inland towards the river. This slope continues for a distance of about thirteen miles from Sukkur, gradually becoming less until the centre of the depression is reached through which the Lukkee flood formerly flowed. Here the slope towards the river ceases, and a little further on the bank begins to fall in the opposite direction; hence it follows that while for the first thirteen miles below Sukkur the least depth of cutting will be found nearest to the river, from that distance onwards the most favourable slope is towards inland, or nearly westward after a distance of 17 miles below Sukkur is reached, at which point the Indus takes a sudden turn to the south.

7. The main line of levels was accordingly continued westward, with cross lines taken at intervals, and it will be seen both by the map and by the section (plan No. 2) that the general slope of the country westward from Sukkur is about ten inches per mile; while from the point where the deep cutting ceases a transverse-slope exists both towards north and south along part of the line and elsewhere in either the one or the other direction, while for the rest the country is so flat transversely that no difficulty will be found in irrigating the land from the canal.

8. The existing canals crossed by the new line are as follows:—

No. of Miles of proposed Canal on which cross- ing occurs.	Name of Canal.	Width at Flood line of 1858.	Bottom Width.	Depth of Water at Flood of 1858.
3	Meer Golam Shah	7	4	3½
4	Kurriah	10	6	2½
5	Kurriah	7½	4½	1½
6	Abadwah	31	26	2½
7	Gurrungwah	36	19	8½
13	Kazikikoor	22	11	4½
17	Rookunwah	12	8	3½
18	{ Koorwah	16	4	3½
	{ Daleekoor	12	6	1½
21	Amrotewah	8	3	2½
23	Sindwah, section taken at Now- shera, 4 miles above point of crossing	30	23	4½
32	Khanwah	13	9	1
36	Chotawah	10	7	2
	{ Hyatwah	16	10½	5
37	{ Khyrakikoor	25	15	6½
	{ Beyrakikoor	23	16	8½
51	Muksoodakikoor	20	14	5½
58	Shahkikoor	25	16	4½

9. On the 63rd mile the Datakikoor will be joined but not crossed by the proposed canal; its dimensions at this point are—width at flood line 32 feet, bottom width 18 feet, and depth 3½ feet.

10. Under the next head of this report will be detailed the manner in which it is proposed to deal with the above enumerated canals, which will not be a matter of difficulty or of considerable expense.

11. In connection with the description of the features of the country passed through, I have now to advert to a circumstance to which you drew my attention at the commencement of the survey as requiring to be looked to in the arrangement of the design. I refer to the liability of the country traversed by the proposed line between the 12th and 17th miles to be laid under water by a flood which in former years occasionally overflowed the right bank of the Indus in the northern part of the Sukkur and Shikarpoor districts, and passing southwards along the depression between Lukkee and Magranee rejoined the river at Jullie. It is, as you are aware, for the

passage of this flood that the bridges on the embanked portion of the road between Sukkur and Shikarpoor have been constructed near Lukkee. For the last three years no such flood has occurred, owing, I believe, partly to a change in the set of the Indus current, and partly to the construction by the revenue officers of some bunds at the upper part of the depression. As, however, another change in the Indus current, or a breach in the bunds referred to, may cause a recurrence of the flood, provision has been made in the designs and estimates for such works as will be necessary to guard against damage being done to the canal in such an event. The works thus required will not be of formidable expense or difficulty; they will be described under the next head of this report.

12. I trust that what has been written so far may have explained what I believe to be the case—that the favourable nature of the levels of the country, the small number of existing canals crossed (and those capable of being easily dealt with), and the absence of any engineering difficulty of magnitude, render the line now proposed peculiarly favourable for the formation of a canal at moderate expense.

13. At the same time I believe that any person who is acquainted with the district which the canal will affect must be aware that the large extent of cultivable land at present lying waste for want of water presents an excellent field for the profitable employment of an increased supply.

14. It will be seen on reference to the map that the tract in question which comprises the portion of the Shikarpoor districts adjacent to their western boundary, together with the north-westerly portion of the Larkhana districts, is indeed watered to some extent by the terminals of the Sind canal, viz. the Hyatwah, Khyrakikoor, and Beyrakikoor, and further westward by the Muksoodakikoor, Shahkikoor, and Datakikoor, all three branching from the Ghar; but these canals being of small size and very deficient in fall afford but a scanty supply, and that merely for a limited extent of khureef cultivation. For some years after the conquest these canals were much neglected, and the cultivation fell off so much in consequence that the people deserted the district in large numbers. Of late years, however, much attention has been paid by the revenue officers to the clearance of these canals, and their efforts have succeeded in considerably extending the khureef cultivation, the inhabitants of many of the villages formerly deserted having returned. Still, however, the supply of water is very insufficient, and rubbee cultivation is unknown, except when an unusual fall of rain brings a flood from the mountains to moisten the tract along the frontier to the westward of Shadadpoor—an opportunity eagerly taken advantage of to raise a rubbee crop.

15. I may here mention that Captain (then Lieutenant) Ford, at that time Deputy Collector of the Larkhana districts, submitted a proposition some years

since to cut a canal from the Ghar near Niadehra, 78 miles in length, to water the tract now under consideration, a work of which he roughly estimated the cost at eight lakhs of rupees. I am not aware what reception this project met with from the authorities, but believe that Colonel Turner objected on engineering grounds to the line proposed. I merely mention the circumstance in illustration of the extent to which the deficiencies of the district as regards irrigation have attracted the attention of the revenue officers.

16. Before concluding this portion of my report I have to state that in accordance with your instructions stone benchmarks have been put down at intervals along the lines of levels. Their position and levels are shown on the map (plan No. 1), and a list of them, giving the particulars of their locality and the names of the persons to whom they have been given in charge, accompanies this report.

COURSE OF CANAL, AND GENERAL ARRANGEMENTS PROPOSED.

17. The course of the canal as determined under the foregoing considerations is shown on plan No. 1, by which it will be seen that, commencing from the rocky bank of the Indus immediately above Sukkur, the line skirts the northern base of the limestone hills near that place, and crossing to the westward of the Sukkur and Shikarpoor road on the 4th mile from the head passes in a direction nearly north-west, and generally parallel with the river, at a distance of from $1\frac{1}{2}$ to 3 miles from its right bank as far as the 17th mile from the head, whence it keeps westward, passing on the 22nd mile close to the village of Mirzapoor, and immediately after crossing the Sind canal a short distance above the point where the latter is joined by the Aleburh; thence, the line continues nearly due westward passing on the 32nd mile, $1\frac{1}{2}$ mile to the north of the town of Drukkun, thence on the 40th mile close by Ruttadehra on the 51st mile by Soojawal, and on the 63rd mile reaching the village of Shadadpoor, where the canal will terminate, joining at this point the line of the Datakikoor, one of the branches of the Ghar.

18. In determining the capacity and levels of the canal the first point to be decided was the level to be calculated on for its constant supply at head, and this has, on your suggestion and approval, been fixed at one foot over the zero or lowest level of the Indus at the proposed head of the canal, a level which appeared likely to meet the requirements of perennial irrigation, as the Indus seldom falls to zero at this point; the period during which it has been lower than one foot over zero having for the last ten years, as shown by the Bukkur gauge registry, averaged little more than a month during each year, which period at least will be required for the annual clearance and repairs of the canal, so that it can be arranged to shut off the water for these purposes at the time when the Indus approaches its lowest level.

19. Having thus determined on the constant level of head supply, the next step was to estimate the quantity of water which the canal should be capable of discharging. In so doing the estimate of Sir Proby Cautley, viz. that eight cubic feet per second per mile of main channel will suffice for the average expenditure of water on a canal of irrigation, has been taken as a basis for calculation, and taking at the same time into consideration the levels of the land, the discharge has been estimated as follows :—

	Expenditure of Water in Cubic Feet per Second.
For the first 19 miles from the head, the water being considerably under the level of the land, and the greater part of the line being through jungle or beyla	None.
From the 20th to the 25th mile, both inclusive, on which, though the water is still generally under the level of the land, yet some cultivation may be carried on by wheel irrigation, besides that a supply may be drawn off into the depression called the Fooceareejodhoro, and for a great part of the year into the Sind canal, on the 23rd mile, at two cubic feet per second per mile ..	12
From the 26th to the 30th mile, both inclusive, the ground being in some places as low as the water level, at four cubic feet per second per mile	20
From the 31st to the 63rd mile, both inclusive, the levels of the land being such throughout as to admit of irrigation by natural flow, at eight cubic feet per second per mile	264
Surplus, to be allowed to flow into the Datakikoor canal ..	104
Making a total discharge required at head of.....	400

20. To discharge this quantity the dimensions of the canal at head have been fixed at 35 feet bottom width, and side slopes of $1\frac{1}{2}$ horizontal to 1 vertical, the depth of water to be 6 feet. These dimensions continue to be maintained for 19 miles from the head, after which the width and depth of water are reduced, as the expenditure of water requires, until at the termination the bottom width becomes $16\frac{1}{2}$ feet, and the depth 3 feet.

21. The bed slope for the first 25 miles from the mouth is to be at the rate of 4 inches per mile, which will give a mean velocity to the stream of slightly more than $1\frac{1}{2}$ foot per second, which your instructions pointed out as sufficient to prevent the accumulation of silt.

From the 26th mile onwards the bed slopes will be as follows:—

From the 26th to the 30th mile 5 inches per mile.

„	31st	„	38th	„	6½	„	„
„	39th	„	49th	„	9½	„	„
„	50th	„	56th	„	9½	„	„
„	57th to termination				9½	„	„

The mean velocities of these portions of the canal will range from $1\frac{3}{4}$ to 2 feet per second.

22. More detailed information as to dimensions, slopes, and velocities proposed will be found in the sections (plan No. 2), and in the description attached to the estimate.

23. So uniform is the slope of the country that the above favourable velocities are obtained without any heavy embankments or masonry falls being required.

24. In the arrangements above described I have, in accordance with your instructions, made the question of navigation secondary to that of irrigation; at the same time it will be seen that the low velocity of current will be very favourable for navigation, and the size of the channel will be sufficient to allow the largest boats in use on the Indus to pass to a distance of 34 miles from the head, while the entire line will be navigable for a smaller class of boats.

To render the canal available for navigation the only special outlay required is the cost of a lock at the head to enable boats to pass in and out at all states of the river, and the extra expense of making the arches of the road-bridges sufficiently high for the passage of the high-sterned Indus boats, with the construction of a towing-path at one side of the arch. These matters have been provided for in the designs and estimate.

25. I shall now refer to the mode in which it is proposed to deal with the existing canals crossed, of which a list is given under the preceding head of this report.

These canals all derive their supply from the Rahoja creek, through head-

Meer Golan Shahwah.

Kurriah.

Kurriah.

Abadwah.

Gurrungwah.

sluices constructed in the Rahoja bund; the surplus waters of the four first-mentioned run to waste in the jungle to the southward, while the Gurrungwah rejoins the

river near the village of Fareed.

The line of new canal has been arranged so as to cut off no important portion of the cultivation carried on by means of the above canals, and it is proposed to dam them up at the point of crossing, and to reduce the supply entering their heads by closing the sluices to such an extent that no more water may pass through than can be made use of in cultivation.

This is a small canal with a very slight fall, which, deriving its supply from the Sind, waters the lands about Kazikika-gote, and passes thence through the Bagurjee beyla, discharging its surplus waters into the river near Bagurjee. It is in the beyla that this canal will be crossed, and here it is proposed to dam it up; its surplus waters may be turned to use in irrigating the beyla, or if not thus required, its head may be contracted at the point where it leaves the Sind to such capacity as may allow sufficient water to pass for the purposes of cultivation without leaving any considerable surplus.

This small canal waters the lands near Rook, being supplied from the Sind canal, though sometimes when the Indus is high it flows in the opposite direction. The new canal will not cut off any of the lands which the Rookunwah waters, and it may be dammed up at the point of crossing, while, should any inconvenience be found to arise from the surplus water, its head may be contracted at the point where it is fed by the Sind.

Koor.
Daleekoor.
Amrotewah.

These three small canals are circumstanced similarly to the Rookunwah, and may be disposed of in like manner.

Sindwah.

This large canal is to be dammed up at the point of crossing.

This arrangement is quite practicable because the Sind at this point may be said to be already partially divided (in fact completely so as regards source of supply), the waters of the upper division being nearly exhausted by the numerous branches at Maree and Nowshera, and its channel correspondingly diminished in section and fall, until at Mirzapoor, where it is joined by the Aliburh, its section is suddenly enlarged, and a little lower down it is joined by the Fazilbuhr, on both of which large canals at the lower division of the Sind is dependent for its supply.

I must here mention that the dimensions of this canal given in the list of canals are those of a section taken at Nowshera, while the section given on plan No. 2 is one taken below the junction of the Alibuhr.

No actual measurement was made at the intermediate point where the proposed canal will cross, the lines of levels not having passed exactly there, but I am aware from personal examination that the section at the crossing is much smaller than that at Nowshera; in fact that the canal is rapidly silting up at this point, there being no current through to keep it clear.

As the level of the bed of the Sind below the crossing will admit of a supply being thrown into it from the new canal during the cold weather, a masonry head of such capacity as may be found requisite will be constructed at this point. ●

This small canal is one of the terminals of the Sind, and is to be supplied from the new canal, not directly but from the Khyrakikoor, through a channel Hyatwah. which at present exists between these two canals, and which will require to be somewhat enlarged for this purpose. This should be done by the cultivators, in consideration of their being relieved under the new arrangement from all share in the clearance of the Sind.

This canal, at present like the last-mentioned, fed from the Sind, is to be supplied from the new canal through an escape-bridge of two openings of eight feet each, which will serve both for the disposal of surplus waters throughout the entire year, and to transmit during the khureef season a sufficient supply to maintain the existing cultivation both on this and on the Hyatwah. It may, I think, at the same time be anticipated that on both these canals, as well as on those to be hereafter mentioned, a considerable extent of the cultivation now watered by their means will be supplied direct from the main line, in which case the canals in question will not require so large a supply as they do at present.

This canal is circumstanced similarly to the last-mentioned, and is proposed to be supplied in like manner by an escape-bridge of two openings of eight feet each.

This canal is at present supplied from the Mitteewah, a branch of the Ghar ; it is proposed, from the point of crossing, to supply it from the new canal through an escape of two openings of eight feet each.

This canal is fed by the Ghar, and is to be supplied from the point of junction through an escape-bridge of one opening of eight feet.

This canal is fed from the Ghar, and will, as already stated, be joined by the proposed canal by which it will be fed.

26. With regard to the disposal of that portion of the waters of the Sind and Ghar at present consumed by those canals which it is proposed for the future to feed from the new line, it will be seen by the map that an outlet exists for the surplus waters of the Sind to flow into the Kadahwah. If, however, it be found that the quantity is too large to be disposed of in this manner, the clearance of the Alibuhr or Fasilbuhr, or of both, should be discontinued to such extent as may be found necessary, so as to diminish the quantity of water passing down the Sind.

As regards the branches of the Ghar, I anticipate that the surplus waters will be made use of in extending the cultivation on the portion of those canals lying between the Ghar and the new line. ~

27. The subsidiary works which will be required in connection with the canal will be referred to under their proper heads, and to complete the description of the general arrangements I have only to notice under this head the mode in which, on your suggestion, it is proposed to guard against damage being done by a flood from the Indus *viâ* Lukkce, to which I adverted under the foregoing head of this report.

This it is proposed to effect by giving the flood full freedom to pass across the line of canal southwards, for which purpose openings, twelve in number and 200 feet in length each, are proposed to be left in the spoil banks of the canal at the lowest part of the depression, the right bank of the canal being also sloped off very flat at each opening. At the same time, to prevent the flood from passing down the canal, a stop-gate bridge is to be built near Rook, in line with the ridge which bounds the depression on the west, so that the canal may be closed across in the event of a flood being expected.

These arrangements are referred to more fully in the descriptions attached to the estimates.

28. With reference to the rates of the canal estimate, I have to remark that they are calculated to afford an average rate of wages to labourers of four annas per day, and that the cost of extra establishment is included in the rates.

REGULATING-BRIDGE AT HEAD OF CANAL.

29. The arrangements and construction of this work are given in full detail on plan No. 4, and in the description attached to the estimate.

30. The position of the bridge has been arranged with the view, as suggested in the 7th paragraph of your instructions, to avoid drawing in sand from the river, and it is expected that this object will be found to be fully met as the form of the river bank is such at this point that its current can be made to act in keeping the approach to the bridge clear, much in the same manner as is proposed to be effected by the escape-channel which you designed in connection with the Rorce and Hyderabad canal head.

31. The bridge is to consist of seven arches, each ten feet in span. This allows a larger water-way than will be required for the quantity of water now proposed to be passed through, so that should the canal be widened hereafter this may be done to a moderate extent without an enlargement of the bridge being required.

32. The regulation of the water is to be effected in a manner similar to that designed by you for the Roree and Hyderabad canal regulator, viz. by means of horizontal sleepers for about one-third of the height, and by vertical sleepers working against walls for the remaining two-thirds. The greater part of the timber is proposed to be of teak, as the most economical for long use, though its first cost will be large.

33. There will be a roadway 18 feet in width over the bridge, independent of the gangway for the men engaged in the regulation of the water.

34. The prices for ashlar have been estimated at a somewhat lower rate than those of the Narra regulating-bridge, both because there is sufficient space to make the piers thicker, and therefore of rather rougher work than those of the Narra bridge, and because the test of experience in the latter work has proved the quality of the artificial hydraulic lime-mortar to be so good that a degree of dependence may be placed on it very much greater than it appeared safe to venture on when designing the Narra bridge to be executed with a description of mortar before untried in the locality.

35. The rates, in common with all others throughout the estimates, include the cost of extra establishment.

LOCK, LOCK CHANNEL, AND BRIDGE ACROSS LOCK CHANNEL.

36. These works are shown on plan No. 4, by which it will be seen that the lock will be situated near the head of the canal immediately below the regulating-bridge.

37. The lock has been designed of similar dimensions as to length and width (viz. 80 feet \times 18 feet) to those of your design for the Roree lock, so as to admit of the passage of the largest native boats in use on the Indus.

To allow of boats passing in and out at the highest inundation level of the river the lift will be 14 feet.

The floor to be level with the bed of the canal, except the gate-sills, which will be one foot higher, so as to have 5 feet of water over them at the constant level of the canal.

38. The bridge across the channel below the lock is required to complete the cross communication in connection with the regulating-bridge; it is to consist of one arch 18 feet in span, with sufficient head room for the passage of boats underneath.

ESCAPES.

39. Escape-bridges, five in number, viz. two of one opening of 8 feet, and three of two openings of 8 feet each, are to be constructed at different points

along the canal, for the escape of surplus water and the supply of existing canals. The particulars of the locality and construction of these works will be found on plans Nos. 1, 2, and 5, and in the description attached to the estimate.

STOP GATE BRIDGE NEAR RQOK.

40. The purpose for which this work is designed has been already described.

Independently of the provision against a flood, a bridge would in any case be required at or near this point for cross communication.

The bridge is to consist of five arches, viz. one centre arch of 18 feet span for the passage of boats, and two on each side 10 feet in span each, all furnished with the means of shutting off the water when required. The cutwaters have been designed semicircular in plan in this as well as all the other bridges throughout the canal, as being less liable than those of the pointed form to be injured by boats or timber striking against them, while the low velocity of the current renders the latter shape the less essential.

MASONRY HEADS OR "COLABAS," FOR DISTRIBUTION OF SUPPLY TO VILLAGE WATERCOURSES.

41. I have estimated for 267 of these works, capable of discharging one cubic foot per second each, or two-thirds of the canal supply, the remaining third being allotted to those canals on which escapes are provided.

The capacity of these heads may require modification according to local circumstances when the works come to be executed, some requiring to be made larger and some smaller. It is, however, considered, that such changes may be made without exceeding in the aggregate the amount estimated.

I have not prepared any design for these heads as I would propose to adopt the plan of those in use on the Ganges canal, of which I have obtained a copy together with the estimate, to which last I have added 50 per cent. to allow for extra cost of labour in Sind.

ROAD BRIDGES.

42. The design of these works is simple and generally similar to those for the Roree and Hyderabad canal, allowing 14 feet head room for the passage of the high-sterned native boats, and having a towing-path 6 feet wide along one side of the arch.

The width of roadway is 15 feet between the parapets.

The number of bridges proposed is five, which, in addition to the regulating-bridge at head and stop-gate bridge near Rook, make a bridge to every nine miles on an average in length of the canal, which it is considered will be quite sufficient for the present requirement of the country. It will be seen on reference to the map that in the more populous parts of the district through which the line passes the bridges as proposed will be closer together than the above-mentioned distance, while the country between the Sukkur and Shikar-poor road-bridge and the stopgate-bridge is generally jungle or beyla, and beyond Ruttadehra the country is thinly inhabited.

BUILDINGS FOR THE ACCOMMODATION OF ESTABLISHMENTS.

43. It is proposed to build two first-class "chokies" or buildings for the accommodation of the executive officers and for their offices and stores—one to be at or near Rook, and the other at Soojawul. It is not proposed to build a first-class "chokey" at Sukkur as house accommodation can be obtained there, and at Ruttadehra there is a Deputy Collector's bungalow, which would generally be available for an officer visiting the works.

It is proposed to build six second-class "chokies" at such points as may hereafter be decided on, probably one near each escape bridge, for the shelter of subordinate establishments and the protection of stores.

PROBABLE RETURN ON OUTLAY.

44. The total quantity of water supplied by the canal will be, as already stated, 400 cubic feet per second.

This volume, according to Sir Proby Cautley's estimate, will suffice for the irrigation of 140,000 beegahs, at 350 beegahs per cubic foot per second.

To allow for the quantity of water which will be used by the existing canals, it is intended to calculate on no extension of the present khureef cultivation, but to assume that one-third of the entire supply will be consumed without producing any increase of revenue. The remaining two-thirds, which will suffice for the irrigation of 93,333 beegahs, will, it is estimated, be used for "rubbee" or winter, spring, and autumn crops, all of which may be calculated on as new cultivation.

On this area I estimate that an assessment of Rs. 2½ per beegah may be fairly levied from the cultivators.

45. That this will be a reasonable rate of assessment, considering the certainty and facility with which irrigation may be carried on from a canal such as that now proposed, and the superior description of crops which may be grown by its means, may be inferred from the fact that in the Larkhana districts an assessment of from Rs. 2 to Rs. 2½ per beegah is paid for a rubbee

crop grown by well-irrigation, at an expense to the cultivator of about Rs. 6 per beegah for raising the water to the level of the land from a depth of 25 to 30 feet.

46. The gross revenue accordingly on 93,333 beegahs, at Rs. 2½ per beegah, will be Rs. 2,09,999.

The total estimate for the proposed works is Rs. 7,29,820, from which, in estimating the return, I proposed to deduct Rs. 31,514, being the cost of the lock and bridge over lock-channel, assuming, as has been done in the case of the Roree and Hyderabad canal, that the produce of tolls on the boats passing through will suffice to pay the interest on first outlay and cost of repairs on this portion of the works, while the establishment employed on the regulating-bridge can work the lock. This amount being deducted leaves the cost of irrigation works Rs. 6,98,306. On the latter sum I proposed to allow 5 per cent. per annum, or Rs. 34,915, for clearance, repairs, and maintenance of working establishments, which amount being deducted from the gross return, as given above, leaves a balance of Rs. 1,75,084 as the nett return which may be looked for on the proposed expenditure of Rs. 6,98,306, or a little more than 25 per cent.

47. In the above calculation account is not taken of interest on the expenditure for the period which will elapse between the commencement and completion of the works. The amount of this would of course depend on the rate of progress made in their execution, in which, if there be no unnecessary delay, the amount of the interest might be added to the expenditure given above without any important reduction in the calculated return.

TIME OF COMPLETION.

48. I estimate that the works may readily be completed within two years. To effect this, as regards the excavation, would require an average daily muster of rather less than 4,000 men, or 63 men per mile of canal—a number which, I have no doubt, will be easily obtained at the liberal rate of wages calculated on, viz. four annas per diem. It is a favourable circumstance that the heaviest part of the works lies in the most populous part of the district through which the line passes.

The masonry works may with ease be completed within the time specified.

BRANCH TO SHIKARPOOR FOR PURPOSES OF NAVIGATION.

49. It remains for me to refer to the question to which Sir Bartle Frere directed attention towards the close of the survey as to the feasibility of making the proposed canal available to facilitate communication between Sukkur and Shikarpoor.

50. I had some levels taken with the view of solving this question, and find that the object may be effected by making a cut, leaving the proposed canal near Rook, at about 16 miles from the head, and extending to Shikarpoor—a distance of a little more than $9\frac{1}{2}$ miles. I have indicated the position of this cut by a dotted red line on the map (plan No. 1). Its bottom width should be 20 feet, and the side slopes $1\frac{1}{2}$ to 1 foot. Occasional “sidings” should be provided at intervals of half a mile to allow of boats passing each other.

To enable the cut to cross the Sind canal near Shikarpoor a lock will be required, so as to overcome the difference of level which will exist between the proposed canal and the Sind during the season when the latter will be full.

The lock might be near Rook, so that the small canals which the cut will cross between that place and Shikarpoor may be fed from it during the inundation season.

The excavation will be heavy, averaging $15\frac{1}{2}$ feet in depth, so as to have six feet of water in the cut at the constant level of the proposed canal.

There will be no current through the cut, so that it will of course have a considerable tendency to silt up, and to become choked by vegetation.

I estimate the cost as follows:—

Excavation.....	Rs. 1,30,638
Lock	„ 26,250
<hr/>	
Total....	Rs. 1,56,888
<hr/>	

INTERFERENCE WITH LINE OF PROPOSED BOAT PASSAGE AT SUKKUR.

51. The proposed line of canal crosses near the head that selected for the boat passage at Sukkur, the design for which was submitted to Government three years since.

Understanding, however, that the latter project is not likely to be carried out, I have not thought it necessary to design the head works of the canal now proposed in the way which should be done at an increased expense, supposing the boat-passage project to be sanctioned.

I have the honour to be, &c.

W. H. PRICE, C. E.,
2nd Executive Engineer, C. D.

Kurrachee, 11th October 1859.

Agricultural.
Irrigation.

No. 1238 OF 1859.

PUBLIC WORKS DEPARTMENT.

From Captain J. G. FIFE,

Superintendent of Canals in Sind,

To the ACTING CHIEF ENGINEER in SIND.

SIR,—I have the honour to submit plans and estimates, with a report by Mr. Price, Civil Engineer, on the proposed perennial canal from Sukkur to irrigate the country south-west of that place, the survey for which was carried out under the authority of the Honourable Court's despatch No. 6, dated 22nd April 1857, communicated under Superintending Engineer's memorandum No. 3312, dated 12th October 1857.

2. In my pamphlet printed in 1855 I proposed that a perennial canal should be carried from Sukkur, with a course parallel to the general direction of the river, to irrigate the country on the right bank on the most advantageous principle, viz. to carry the water along at a high level to facilitate and cheapen its distribution, and at the same time to have it under perfect command so as to be quite independent of the capricious rise of the inundation which, as explained in the pamphlet, never corresponds for two consecutive seasons.

3. The Honourable Court, in the despatch above quoted, while fully recognising the importance of this and other projects brought forward at the same time, pointed out the necessity that existed for a survey to determine satisfactorily the feasibility of the scheme. The survey carried out by Mr. Price last season, the results of which are now submitted, fully establishes this, and the project for a comparatively small canal now submitted may be looked on as the first section of the greater work of improvement to be ultimately carried out.

4. The proposal I made for irrigating the country by means of a large canal from Sukkur was based on no hasty conclusion, but on facts carefully ascertained, and on careful consideration of the whole subject of the prosperity of the province. These views, which, I should remark, are shared in by all who have any intimate knowledge of the subject, and especially by the officers of the canal department, are, I am still satisfied, perfectly sound. The best mode that can possibly be adopted for at once largely increasing the revenue of the country and improving the condition of its semi-barbarous population

is to facilitate irrigation by means of perennial canals, and afford the people constant and regular employment, with a certain return for their labour, all the year round. For a correct view of the present condition of the country I would draw attention to the facts carefully explained in my pamphlet attached hereto.

5. To at once undertake works on so large a scale as those first proposed by me is, however, a scheme which would be attended with difficulty on account of the scarcity of labourers in Sind; and though perfectly satisfied myself that these works when carried out will be a blessing to the country, and prove, both directly and indirectly, enormously remunerative to Government, I am perfectly aware that Government must naturally hesitate at making so very large an outlay as would be required to at once carry out the scheme on the scale first proposed, no matter how strong the arguments in favour of such a course may be. It is only reasonable that Government in place of arguments should require absolute proof in facts that such works are both as feasible to construct and as remunerative as is maintained before it can sanction an outlay which might amount to more than a whole year's revenue of the province. As I have before stated, I am still quite satisfied that the great scheme for the improvement of the country is based on sound data, but I would request at present no further outlay on the part of Government than will suffice to carry out the various projects on a small scale; and I myself and the whole of the officers under me wish for no more advantageous condition than that the carrying out of the grander works shall be made to depend on the success which may attend our execution of the smaller ones. It was under these views that I requested Mr. Price to draw up a project for a small canal to irrigate the country south-west of Sukkur—a work which may afterwards be enlarged and extended till it at length fulfils the conditions laid down in the pamphlet.

6. For a description of the project now submitted I would refer you to Mr. Price's clear and able report and the plans which accompany it, which have been prepared with the greatest care. I have nothing to remark on the details as the subject has been frequently discussed by Mr. Price and myself; I have merely to record my entire approval of the plans.

7. From Mr. Price's report it will be seen that it is proposed to make the canal 35 feet wide at bottom at head, with a depth of water of 6 feet, and that its length will be 63 miles. The cost, exclusive of the lock at the head, which will afford a return of its own for navigation, will be Rs. 6,98,306, and the probable return is estimated at 25 per cent. In estimating the return it will be observed that the whole of the irrigation on the canal has not been included. It has been assumed that the khurreef crop will not be additional cultivation, but merely a transfer from existing canals to the new one. This is, I think, less

than justice to the new work—*first*, because the khurreef crop in Upper Sind has not yet reached its limit, each season showing an increase on the preceding one; and *secondly*, because the same number of cultivators will produce a greater result in khurreef cultivation on the new canal, owing to the supply of water being more certain and at a more convenient level, than they will on the old inundation canals. The estimate, however, errs on the safe side, and I therefore do not wish to alter it. The rates for the different kinds of work in the estimate of cost have been entered that Government may be better enabled to see that the probable expenditure has not been under-estimated.

8. In conclusion I would most earnestly recommend the project for sanction. The khurreef revenue in Upper Sind shows a steady improvement each season, proving that the present population is capable of extending the cultivation even of that crop. The rubbee and peshrus crops that may be grown on this canal will be entirely additional cultivation, and from the great facility that will be afforded for irrigation the whole year round it is certain that the more valuable products, like sugar and indigo, will be brought into the market at a sufficiently low price to ensure exportation. At present those articles are comparatively rarely grown in Sind, owing to the uncertainty of the supply of water and the heavy cost of raising it from deep canals and wells to the level of the ground.

I have the honour to be, &c.

J. G. FIFE,

Superintendent of Canals in Sind.

Superintendent of Canal's Office, Camp Gooja,

7th November 1859.

Agricultural.
Irrigational Canals.

No. 246 OF 1860.

PUBLIC WORKS DEPARTMENT.

From Colonel H. BLOIS TURNER, Chief Engineer in Sind, †

To J. D. INVERARITY, Esq., Commissioner in Sind, on Circuit.

Printed pamphlet on the Irrigation of Sind by Captain Fife.

Report by Mr. Price, C. E., No. 29, dated 11th October 1859, with the following accompaniments :—

Plans Nos. 1 to 7 (sent separately in a tin case).

Estimate amounting to Rs. 7,29,820.

Index Map.

List of Bench-marks.

List of Plans.

SIR,—I have the honour to submit for your consideration a letter from the Superintendent of Canals, No. 1238 of the 7th November last, and the annexed documents, as per margin, relating to a project prepared by Mr. Price, Civil Engineer, for a canal from Sukkur to Shadadpoor, formerly one of the frontier posts of the Sind Irregular Horse. The estimate amounts to Rs. 7,29,820.

2. The proposed canal is one of those which has for some years past been strongly recommended by Captain Fife for the irrigation of this province in supersession of the existing inundation canals, and the general system of irrigation of which this would form an integral part has received the cordial approval of your predecessor.

3. My own views on the subject generally have already been expressed, and if canals can be constructed in this province for the sums they are estimated to cost, to supply the quantity of water promised at a level high enough to admit of the land being irrigated without lifting the water, no one can doubt that they will create a most beneficial change in the welfare of the province, and enable it to pay a very much larger revenue than it does at present; but there are some difficulties to be overcome which are not fully met in the project now submitted.

4. The Indus water is very highly charged with silt, more so, I believe, than that of any other river in British-India. If that silt be admitted into a canal the stream in it must flow with sufficient velocity to carry it on to the land, or it will deposit in the canal itself, choke it more or less towards the end of a season, and must be removed annually by manual labour.

5. This silt-charged water would be admitted into the canal now proposed, and Captain Fife expects that the stream will be sufficient to carry forward some portion of it, the remainder being deposited in the canal, to be removed

during one month in the cold season, when the river will be at its lowest, and water be shut out of the canal by closing the regulating head-sluice.

6. The velocity of the Indus at the spot whence the canal will draw its supply is not given; that of the water in the canal is estimated at $1\frac{1}{2}$ foot per second. Mr. Price tells me that he has ascertained that the mean velocity of the low Indus at Jerruck is 6 feet per second, and it is fair to assume that at the canal head it is not less in the cold weather, and much greater in the inundation; if so, the velocity of the water will suddenly be reduced from at least 6 feet to $1\frac{1}{2}$ foot per second, and the certain consequence, in my opinion, will be a very considerable deposit in the bed of the canal. What the amount of that deposit may be it is impossible to ascertain with certainty; but if the quantity of deposit held in suspension be, as I believe it is, in direct proportion to the velocity, an useful approximation might have been obtained. In the heads of some of the Indus canals 4 feet of silt is sometimes deposited during the four or five months they flow; the proposed canal is to flow eleven months before it is cleaned.

7. The effect of the deposit is not merely to add to the expense of maintaining a canal, but it seriously affects the discharge also. Suppose, for argument's sake, that near the head of the proposed canal 3 feet of silt be deposited during the first six months after it is cleared, for the remainder of the season the canal would run full only when the river is 4 feet above zero.

8. During the first 20 miles of its course no cultivation from the proposed canal would be feasible; in the next 10 miles very little water could be used. All, or nearly all, the land therefore between the river and a line drawn parallel with it, cutting the proposed canal at the 30th mile of its course, must continue to be dependent for cultivation on the existing canals; they ought therefore to be maintained in an efficient state; but I fear the mode of dealing with them described in the 25th paragraph of Mr. Price's report would prove injurious to them.

9. Neither am I satisfied with the mode adopted for passing across the proposed canal the inundation to which the low land alluded to in paragraph 27 of Mr. Price's report is liable; every time a flood might come it would probably do serious mischief.

10. The head of the proposed canal would interfere with another important project of Mr. Price's, viz. a locked passage to enable the steamers to ascend the rapids opposite Sukkur. Captain Fife has proposed in lieu of that project to widen the river at this point. Not having seen the latter proposal, I am unable to say more than that such a project is open to some objections, possibly of minor importance to the proposed canal.

11. With the above exceptions I cordially approve of the project. It has been very carefully considered, and like all that Mr. Price does has been

drawn up with great ability and care. All the objections I have raised, excepting that relating to the silt, may easily be removed by details in the construction; and with regard to the silt Captain Fife has doubtless given his attention to the question, and may have made experiments of which I am unaware; no allusion to them, however, is made either in his or in Mr. Price's report. The late Lieutenant Chapman did make some experiments one year at Jerruck, but they were not conclusive even, I believe, to himself.

12. I should have referred my objections for Captain Fife's consideration, but he is urgent that there should be no further delay in forwarding the project to you. The delay already has been very great in consequence—first, of Lieutenant Colonel Hart's leaving it for my consideration; and secondly, from my having kept the project till I could discuss certain questions relating to it with Mr. Price, in the belief that in so doing I should save instead of lose time; but he did not join his new appointment so soon as I expected.

I have the honour to be, &c.

H. BLOIS TURNER, Colonel,
Chief Engineer in Sind.

*Kurrachee, Chief Engineer's Office,
4th February 1860.*

No. 44 of 1860-61.

PUBLIC WORKS DEPARTMENT.

To the CHIEF ENGINEER in SIND.

The Chief Engineer is requested to be good enough to refer his objections for Captain Fife's consideration, and to report the result.

J. D. INVERARITY,
Commissioner in Sind.

Kurrachee, Commissioner's Office, 4th May 1860.

No. 1268 OF 1860.

REPORT.

I annex a copy of a letter, No. 531 of 1860, from Captain Fife, explaining his reasons for doubting the validity of the objections raised by me to his project for a perennial canal from Sukkur to Shadadpoor.

2. Those objections were four in number, and are briefly enumerated in the 1st paragraph of Captain Fife's letter.

3. With regard to the first, viz. that arising from the deposit of silt in the canal, Captain Fife remarks that if it pays to clear an inundation canal which draws water from the river when the silt is greatest, *a fortiori* it will pay to clear a perennial canal which draws water also when it is not so highly charged with silt. If my objection had merely been to the cost of removing the silt this explanation would have had much weight (a slight reduction in his estimate of profit would have met the difficulty), but I apprehended a greater and more serious loss of profit arising from the canals becoming dry for a much longer period every year than has been allowed for.

4. Captain Fife considers that the fairest mode of disposing of the point is to reason by analogy, and in opposition to the theory advanced by me he instances the Narra supply-channel, in which no silt was deposited even when the stream was checked by partially closing the head sluice; but in reasoning by analogy it is obvious that similar results can be reasonably expected only from similar premises. Now in the instances adduced by Captain Fife the premises are not similar; the fall of the bed of the Narra supply-channel is 1' or 1' 1" per mile, and that of its flood line is 1' 3", whereas those of the Indus are probably only 4" or 5"; therefore in the Narra supply-channel instead of silt being deposited, the bed is torn up; and although the regulator was partly closed at the time when, as Captain Fife mentions, silt was not deposited, it is evident that there was still sufficient velocity to carry the silt forward.

5. Two cases occur to me which, if analogy is to be our guide, would lead to a very opposite conclusion. The two cuttings recently made in the vicinity of Hydrabad to feed the Foolalic and Gaza are straight, and have a greater velocity of current than the proposed perennial canal; yet at the mouth of both of them there was last year a deposit of silt fully four feet deep, although they were flowing for about four months only; it is therefore reasonable to suppose that the deposit near the head of the proposed canal would exceed four feet.

6. Captain Fife states that during the cold season the Indus water contains much less silt than during the inundation, and he is probably correct;

but he seems to forget that during the four months of inundation, when streams more rapid than his proposed canal collect four feet of silt at their mouths, his canal is also supposed to run full,* and that therefore whatever silt might collect in the cold season would be in addition to that which would accumulate both in the inundation and proposed canals during the inundation.

7. When I addressed you my letter No. 246 of the 2nd February last, I understood Mr. Price to say that the mean velocity of the Indus at Jerruck was six feet per second; but it now appears that I misunderstood him, and that when he informed me that the velocity of the Indus at Jerruck was six feet per second, he alluded to the maximum velocity. So far as my argument is concerned the difference is of little consequence. I believe that if the velocity of the stream be permanently checked, deposit of silt will take place, and whether the check be from 6 feet to $1\frac{1}{2}$, or 3 to $1\frac{1}{2}$, the result will be similar, though of course less in extent.

8. The theory advanced at the end of the 4th paragraph of Captain Fife's letter is possibly correct, and if so the water which would flow into the proposed canal would be less charged with silt than ordinary Indus water; still I fear the quantity of silt would be in excess of what he expects; and if it be nearly equal in quantity to that deposited in the Hyderabad and Hajecpoor cuttings, it would, if Captain Fife's plan be not modified, seriously affect the profits of the project; for the surface of the water in the canal is to be maintained at a level of one foot above zero in the river; the bed of the canal is therefore five feet below zero in the river; the canal is intended to flow eleven months; but assuming that at the end of September four feet of silt be deposited in it, the head of water would be less than six feet whenever the river may fall below the level of four feet above zero. I have not a correct chart of the rise and fall at Sukkur, but judging from that at Kotree the water in the canal would, if the silt I expect be deposited, and no modification of plan be adopted, decrease in volume in most years after the middle of October.

9. The modification of plan suggested in the 5th paragraph of Captain Fife's letter would, if carried out, in some measure remove my objection; for if a hollow were made in the part of the canal in which deposit would take place, it would doubtless act as a silt trap, and the only objection that occurs to me is the increased difficulty there would be in removing the silt.

10. If, as Captain Fife states in the 6th paragraph of his letter, the country indicated by me be almost wholly waste, my objection is of course removed; but as the question has been taken up by Mr. Daley, and as Captain Fife did not notice that gentleman's remarks, I have obtained Captain Soady's opinion, from which, and from further explanation by Mr. Price, I am induced to believe that no serious loss would result from the plan proposed for dealing with the canals which the perennial canal would cross.

11. The third objection raised by me need not interfere with the commencement of the project. I am still under the impression that that portion of the surface of the side-slopes and bed of the canal across which the Lukkee inundation would pass would suffer unless protected, my opinion being based upon the experience gained from the effect of the same flood passing under the bridges in the Lukkee embankment. The expense of protecting the surface would add somewhat to the estimate, but that is all.

12. My objection to widening the river at Sukkur is that as the water is now headed back by the obstruction which that rocky pass creates, the removal of that obstruction by decreasing the head above would affect the level of the water in the canals which leave the river for some distance above Sukkur, and consequently land now watered naturally might no longer be so, and owners of such land might justly complain and demand compensation.

13. I have not had an opportunity of seeing the project in question, and do not know to what extent it was expected that the head would be reduced. The project for widening the river is only conditionally connected with the proposed canal. A plan and estimate for a locked-channel to enable vessels to pass the Sukkur rapids during the inundation have been submitted and approved, but as the position of the head of that channel would interfere with the proposed perennial canal, it has been proposed to widen the river as a substitute for the locked-channel.

14. As the objection regarding silt, if it exist at all, is applicable to the Roree canal as well as to that now under consideration, and in fact to all the proposed perennial canals excepting that from Mitrow, I should be very glad were this Sukkur and Shadadpoor canal sanctioned as an experiment. In no case can the money be lost, for as the water to be provided will flow to a country at present indifferently cultivated, it is certain to produce a considerable revenue, and the execution of this canal will afford valuable data to guide Government in sanctioning or otherwise the more costly projects.

I have the honour to be, &c.

H. BLOIS TURNER, Colonel,
Chief Engineer in Sind.

Kurrachee, Chief Engineer's Office, 21st May 1860.

No. 531 of 1860.

PUBLIC WORKS DEPARTMENT.

From Captain J. G. FIFE,

Superintendent of Canals in Sind,

To Colonel H. BLOIS TURNER,

Chief Engineer in Sind.

SIR,—I have the honour to acknowledge the receipt of your memorandum No. 1112, dated 7th May 1860, asking for explanation and remarks on the subject of the perennial canal from Sukkur to Shadalpoor.

as per margin, forwarding for further explanation the project for a perennial canal from Sukkur in the Shikarpoor collectorate. The points referred for explanation are—*first*, the silt deposit which will take place to some extent in the canal each year; *secondly*, from its crossing the tails of existing inundation canals along the first thirty miles of the proposed canal's course; *thirdly*, the arrangement for passing off the Lukkee flood; and *fourthly*, certain objections to widening the River Indus at Sukkur.

2. Respecting the silt deposit I think the fairest way of disposing of the point is to reason by analogy. If it pays Government to clear the silt from existing inundation canals, which draw their supply of water from the Indus during the inundation period when the quantity of silt in suspension is the greatest, it must surely pay to clear a perennial canal which will draw the greater part of its supply from the river when it is not in flood. The inundation lasts four months. The comparatively quiet period eight months. The perennial canal has also this great additional advantage, that from its construction the stream can be kept up to a maximum velocity, whereas the inundation canal contains a varying stream which at the commencement and conclusion, and indeed sometimes in the middle of the inundation, runs with a low velocity—a circumstance which of course favours excessive silting. The conclusion I arrive at is that for any given volume of water supplied during the year the perennial canal will draw in a smaller quantity of silt from the river than the inundation one, and that it will allow a smaller proportion of whatever silt does enter to accumulate than the inundation canal.

3. The circumstance of an accumulation of silt in the upper part of the canal affecting the supply of water has received my most careful attention,

but I do not anticipate any serious inconvenience. From the low level at which the proposed canal can draw off its full supply from the Indus, it will nearly always be requisite to keep the regulator partially closed. We shall therefore always have an extra head or extra supply of water to fall back upon when the canal may be encumbered with silt. The period when the clearing will be requisite will be after the inundation subsides, and when the canal is again opened during the low season the river contains, and consequently the canal will receive, the minimum quantity of silt. I think that the circumstance of the Narra supply-channel mouth not choking with silt during the past low season shows most clearly that during that period we have much less chance of inconvenience from silting than might at first be supposed. The Narra supply-channel regulator was closed on the 30th September, and though the river continued falling steadily, there was still a free passage for boats in and out of the mouth in the beginning of January, the Indus being then within a few inches of its lowest level, and the proper bottom of the supply-channel being only about two feet below that level.

4. I should remark here, with reference to the 6th paragraph of your report No. 246 of the 4th February, that the velocity of six feet per second observed in the Indus at Jerruck during the low season was the maximum centre velocity, which at the side of the channel was less than three feet per second. I should also mention an important particular with respect to the stream of the Indus above the rapid at Sukkur whence the canal will derive its supply, and this is that the extraordinary contraction which causes the rapid, and which will still exist to a considerable degree even after the channel is widened to lessen the rapid, for which a separate project has been submitted, has the effect of ponding back the stream and reducing its velocity above. The result of this is that the current, except at the bottom of the river, contains a smaller quantity of silt than usual. The under-current sweeps the silt into the rapid, where it is scoured up from the bottom. The upper-current above the rapid contains an unusually small quantity of silt, while in the rapid itself the violent eddying of the water scours the silt from the bottom and loads the whole of the water with it.

5. I would finally observe on this point that the allowance made by Mr. Price for maintenance is a very liberal one, and would, in my opinion, provide for very efficient means of clearing the silt from the canal. The bottom of the canal might, if necessary, be sunk a little lower than as designed, to provide a kind of trap for silt, and so make room for a larger quantity, should I prove wrong in supposing that serious inconvenience will not be experienced from silting.

6. The second point referred for explanation is the arrangement for crossing the tails of the canals for the first 30 miles of the proposed canal's

course. The tract of land indicated by you is, I beg to state, almost wholly waste or covered with jungle. Its total exclusion from the benefits of irrigation would cause but a trifling loss. But Mr. Price does not propose so to exclude it; and if the arrangement he has proposed should have the effect of interfering at all with its existing irrigation, and no other arrangement should be feasible, it should, I think, be remembered that the perennial canal's supply, though here much below the surface of the ground, would still afford water for a wheel rubbee crop, which the existing canals cannot supply.

7. The third point for explanation is the arrangement for passing off the Lukkee flood. This flood has not made its appearance for some years, but I do not anticipate any serious evil result from it should it come again. By closing the stop-gate provided further down the canal and thus ponding up the water as the flood approaches, injury from the complete filling of the canal will be obviated. These floods flow across the country very slowly, and are free from silt. If therefore the canal were previously filled up to the level of the ground, the flood water would pass quietly over it just as floods already pass over inundation canals in certain localities in Sind. If the proposed canal were an embanked channel instead of being in a cutting where the flood will cross it, the case would be different: the embankments would be carried away, and our supply of water would run to waste; but if you will refer to the section you will observe that we are quite free from this danger. The only disadvantage the flood will cause when it may come will be an increased silting of the canal where the water is ponded up. This disadvantage will entail an increased expenditure for clearance for that particular season, just the same as on the present inundation canals, but nothing more.

8. The fourth point is the enlargement of the river at Sukkur. The objection to this you were kind enough to explain to me. The lowering of the river's surface would affect the canals in the neighbourhood. Having a very intimate knowledge of this part of the river however, I can take it upon myself to state that this injury will be inappreciable in extent if any should really be caused, and the question is one which admits of argument. The effect of widening the channel of the Indus (the object of which is, as you are aware, to get rid of the rapid which so seriously obstructs the irrigation) will be to slightly lower the surface of the river during flood. It would not lower the surface during the low season because the excavation of the extra width is not to be carried below the cold weather level of the river. The effect therefore will be to cause less variation than at present in the level of the river during the year. This increased steadiness is an advantage in irrigation. There are very few canals, however, which derive their supply from the river near Sukkur, and as both banks are liable to inundation, one of them in fact being strongly embanked, I think that you will agree with me in

considering that the objection you have pointed out is really a very slight one, and should not stand in the way of the execution of so important a project as the one now under consideration.

9. In conclusion I would beg to observe that the delay in getting the project submitted to Government has been very great, but as it was provided for in the budget statement which was submitted for the Canal department, I trust that provision may be made during the coming cold season for at least commencing the work. Unless this is done (and a sum of Rs. 25,000 would suffice) another year will be lost. By allotting a small sum, such as I have mentioned, to this work, the Canal department would be enabled to get everything in train for a larger expenditure during the following year, and very nearly a year would be gained in the progress of the work.

10. The accompaniments to your memorandum are herewith returned.

I have the honour to be, &c.

J. G. FIFE, Captain,

Kurrachee, 7th May 1860.

Superintendent of Canals.

(True copy of original letter)

J. R. SOADY, Captain,

Acting Superintendent of Canals in Sind.

(True copy)

II. BLOIS TURNER, Colonel,

Chief Engineer in Sind.

No. 2652 OF 1859.

PUBLIC WORKS DEPARTMENT.

Communications.
River Improvements.

From the ACTING CHIEF ENGINEER in SIND,
To the COMMISSIONER in SIND, Kurrachee.

SIR,—In reply to your letter No. 1243, dated the 6th June 1859, I have

Captain Fife's original report, No. 1256,
dated the 10th November 1859,

Lieutenant LeMesurier's report,
No. 203, dated the 26th October 1859.

Lieutenant LeMesurier's estimate,
No. 5 of 1859-60, amounting to
Rs. 2,05,984.

Lieutenant LeMesurier's general plan
of the right bank of the River Indus at
Sukkur, showing the proposed improve-
ment to the river bank.

Regarding the widening of the right
channel of the River Indus at Sukkur
between Sukkur and Bukkur island, in
order to reduce the violence of the current
so as to allow steamers to make the passage
of the pass during the inundation.

now the honour to submit the correspon-
dence, with plan and estimate as per
margin, for the improvement of the Sukkur
channel recommended by Captain Fife.

2. It will be seen from my letter
No. 1046, dated the 27th April 1859, that
provision was made for this work in the
general review statement of 1857-58 for
Rs. 1,78,971; but allowing for the rise
which has taken place in the cost of
materials and labour since that estimate
was framed, Captain Fife is of opinion that
the cost of the work now would be

Rs. 2,16,000, or an increase of a little more than 20 per cent. on the original
estimate, which I think is highly probable.

3. The present estimate of the new project for improving this channel by
removing a portion of the Sukkur bank so as to lessen the violence of the current
in the pass, instead of constructing a canal with docks, amounts to Rs. 2,05,984,
or Rs. 10,016 less than this latter project, if the increase in prices be considered,
which was prepared by Mr. Price, C. E., 3rd Executive Engineer in the Canal
department, and recommended (but I think not sanctioned as stated by
Captain Fife) for the sanction of the Government of India.

4. I consider that this project has been carefully prepared; that the object
to be attained is one of very great importance; and I would earnestly beg to
recommend Captain Fife's proposal for the consideration of Government. It
appears to me that even Rs. 10,000 judiciously expended on this work would
have an immediate result, and the effect produced could be carefully watched
during the inundation and reported on before any further expenditure was
incurred.

I have the honour to be, &c.

PHILIP D. HART, Lieut. Colonel,
Acting Chief Engineer in Sind.

Kurrachee, Chief Engineer's Office, 18th November 1859.

No. 1256 OF 1859.

River Improvements.

PUBLIC WORKS DEPARTMENT.

From Captain J. G. FIFE,

Superintendent of Canals in Sind,

To Colonel H. BLOIS TURNER,

Acting Chief Engineer in Sind.

SIR,—In continuation of my letter No. 406, dated 16th April last, I have the honour to submit a plan and estimate, amounting to Rs. 2,05,984, for enlarging the right channel of the Indus at Sukkur, to reduce the velocity of the current and facilitate the passage of boats and steamers past the rapid at that place.

2. Lieutenant LeMesurier paid a great deal of attention to this subject during the past inundation, and at first submitted a project for a work on a much smaller scale than that provided for in the estimate now submitted. I however requested him to provide for a further enlargement in order that Government might see with certainty from the first what expenditure would be incurred in improving the river in such a manner as to provide the same facility for the passage of boats and steamers as would be provided by the canal and lock. The latter project was estimated to cost Rs. 1,78,971, which was sanctioned by the Government of India; but allowing for the rise of rates which has taken place since the estimate was prepared, the cost would now be Rs. 2,16,000. The cost of the enlargement of the river will be Rs. 2,05,984. As far as original cost goes therefore the new plan has an advantage over the other one. There are, however, two other important advantages. In the new plan we shall have expenses for neither repairs nor establishment to attend to the lock-gates. The enlargement of the river once effected, there will be no further trouble or expense.

3. Lieutenant LeMesurier's letter explains the nature of the rapid, and I consider that the enlargement of channel provided for in his estimate will prove sufficient. It will be observed that Lieutenant LeMesurier calculates on the velocity of the current in the narrow channel not being reduced by the reduction of head of water. This, though at first sight appears quite wrong, is nearly, if not quite true. The entrance of the narrow channel is now so

confined, and the channel of the Indus above so wide, that the water is ponded back and has a comparatively small "velocity of approach." When the entrance is widened, the velocity of approach will be so much increased as to compensate for the loss of head in producing a high velocity.

4. In conclusion I would beg most earnestly to recommend that sanction be given to Rs. 10,000 to enable a commencement to be made with this work before another season passes away. The proper time for carrying on the work is from the present month till May, when the rise of the inundation will retard its progress. But much may be done before that time; and in a work of this kind there is always the satisfaction of having an immediate result for whatever expenditure is made—every cubic yard of rock removed will increase the facility for passing the rapid. I watched the disadvantage the boat traffic laboured under from the difficulty of passing this rapid for three years when I was employed at Sukkur, and I can confidently state that had any work been at once provided to remove the evil, a rate of toll which would have quite covered the whole outlay by this time would have been cheerfully paid by the owners of boats. I daresay you are aware that it is necessary to tranship cargo from steamer to steamer at Sukkur during the inundation, owing to the difficulty, and often impossibility, of getting a steamer up the rapid; while from its being impossible to time the steamers between Kotree and Sukkur and Sukkur and Mooltan very exactly, it constantly happens that a steamer has to be kept lying idle at Sukkur. Government therefore loses the services of a steamer, as well as incurring the expense attending transshipment of cargo.

5. No expense will be incurred on account of establishment for this work, as the officer in charge of the Narra will have leisure to attend to it.

I have the honour to be, &c.

J. G. FIFE, Captain,
Superintendent of Canals in Sind.

*Kurrachee Collectorate, Superintendent of Canals' Office,
Camp Hillyah, 10th November 1859.*

No. 203 OF 1859.

River Improvements.

From Captain J. LEMESURIER,

Acting Executive Engineer in Sind,

To Captain J. G. FIFE,

Superintendent of Canals in Sind.

SIR,—I have the honour to forward to you plan and estimate of a project for the improvement of the right channel of the Indus between Sukkur and Bukkur Island, drawn up in accordance with instructions contained in your letter No. 407, dated the 16th April 1859.

2. Owing to the strength of the current during the inundation and to the strong eddies in the channels, I was unable to follow out your instructions exactly as regards the soundings, but I took them in different parts of the channel the whole way down sufficiently close to enable one to form a very correct idea of the nature of the bed and of the depth of water in the channel during the inundation.

3. Commencing at the upper extremity of the pass in the strength of the current, at about 100 feet from the outer corner wall of the fort, passing along the inner wall underneath the telegraph tower, at about 55 feet distance, and terminating at the extremity of Bukkur Island. Midway between it and the mainland I found the depth of water to run from 45 to 60 and in parts 65 feet. Opposite the gateway of the fort, near to the telegraph tower and 180 feet from the outer fort wall, the depth of water is from 40 to 45 feet. A little below this the bed takes a sudden fall and I found no bottom at 85 feet. This is merely a hollow in the bed, as below this again the depth of water decreases to 57 and 60 feet, and continues at this depth to the end of the island where it begins to get shallow. From the end of Bukkur Island to Fukeer's Island the depth of water in the strength of the current decreases gradually from 45* to 40 and 30 feet, continues from 15 to 20 feet deep past the island, and then increases again from 20 to 40, 45, 50, and 60 feet opposite the point by the Indian Navy bungalow.

4. The cross sections the whole way down are regular, decreasing from the centre, where the strength of the current is, to the banks on both sides, gradually towards the shore but more abruptly towards the islands.

5. The strength of the current in the two channels of the Indus varies greatly each year, depending on the set of the stream above the pass, and it

would be impossible to find the discharge of either of the channels separately for any one year. This year the set of the stream was directly down the main or Rorec channel, and the strength of the current there was 9 feet per second, or $6\frac{1}{2}$ miles the hour. In the Sukkur channel there are two or three currents flowing with different velocities which meet in the pass, and are carried along at a velocity something like a mean of them all. The velocity past the fort wall at one time I found to be $9\frac{1}{2}$ miles the hour. The mean velocity in the narrowest part of the pass where the currents meet was this year 10 or 11 feet per second, or about $7\frac{1}{2}$ miles per hour. When the set of the stream is different and directly down the Sukkur channel, this velocity runs up as high as 9 and 10 miles the hour.

6. The sectional area of the Sukkur channel in its narrowest part is about 10 or 15 square feet, but the velocity of the stream is not constant over the whole of this area. On the left or in the deepest part of this section the velocity is about 10 feet per second; but at the right the stream is so broken up by strong eddies and a backwater that the discharge over this portion of the area must not be taken into consideration. The two areas may be taken as follows :—

$$\begin{array}{r} 1,524 \text{ square feet.} \\ 8,491 \text{ square feet} \times 10 \text{ feet velocity} = 84,910; \text{ say } 85,000 \\ \hline 10,515 \end{array}$$

cubic feet per second for the discharge of the right or Sukkur channel of the Indus.

7. In the left channel of the Indus, between Rorec and Fort Bukkur, opposite the cardarate, and in the strength of the current, I found no bottom at 90 feet. Nearer Fort Bukkur, a little more than half way across, I found bottom at 63, 65, and 67 feet, and on both sides nearer the shore the depth of water was from 30 to 40 feet; in some places less than this. The channel is about 600 feet wide in its narrowest part opposite the cardarate, and the mean depth is about 40 feet, and the mean velocity (uniform for about five-sixths of the width) I found from experiment to be 9 feet per second. This gives the discharge $500 \times 40 \times 9 = 180,000$ cubic feet per second for the discharge of the left channel, and 365,000 cubic feet per second for the whole discharge of the Indus.

8. The present width of the right channel between Fort Bukkur and Sukkur in its narrowest part is at height of inundation about 320 feet. But about 120 feet of this is taken up by a strong eddy and backwater which rushes up with a considerable velocity, and 200 feet in width is alone available for discharge. I propose widening the channel at this part to 510 feet. The rock excavation here will be 225 feet wide, and the increase of area given will be 2,925 feet. This, added to 1,524, the area which is taken up by

the backwater and eddies in the present state of the river, will give the whole increase of area rendered available for discharge 4,449 square feet, and the whole area of the Sukkur channel will become 12,940 square feet. As the mouth of the pass or entrance to this channel will be enlarged and opened out by about an extra 275 feet, the velocity of approach consequent on this will be considerably increased, and the new velocity in the channel will not be materially lessened. The whole area of the two channels of the Indus before and after enlargement are 28,491 and 32,940 feet; and as the mean velocity which would discharge the whole volume of the Indus before enlargement is 9.3 feet per second, the new velocity would be 8.04, and the decrease of head consequent on enlargement would be 4½ inches. The area will then become of the two channels 12,770 and 19,800; and as the velocity of the right channel will not be lessened, the discharge of this channel will be 127,700 cubic feet per second, and for the discharge of the Roree channel will remain 137,300, which will give a velocity in that channel of 6.93 feet per second, or 4.7 miles an hour.

9. I have not included in this project the reclaiming of the bay between the post-office and the Indian Navy bungalow, and for these reasons, that at present native boats coming up river sail close under the point in the back current which runs there and get up weigh enough to carry them through the strong current which sets past the point and into the eddy under Wood Island. They can then from this point just make the bay on account of the slack water or gentle back current there. But if this bay were reclaimed and the still-water turned into a current, the boats would be unable to make the bay, and would get carried back against the stones and get injured. As it is they sometimes miss and a hole is knocked in the boat against the point. A small portion of the bay shown on the plan by a red tint can very well be reclaimed, and it would be a great improvement, as the roadway is very bad just in that part. I purpose reclaiming a portion of the bend between the residency and the end of the present bunder below the ferry ghaut where the cutting will terminate. The roadway is very narrow there and the trackway bad. Places are very confined too for throwing the spoil out, and it may as well be thrown in here as anywhere else.

10. As the stream after the proposed widening is carried out will most probably set a little more along the right bank than it does at present, the whole of the trackway along the bank of the river should be improved and all the trees cut down, that there may be no impediment to the boatmen when tracking their boats up.

I have the honour to be, &c.

J. LEMESURIER, Lieutenant,

Acting Executive Engineer, Sind.

Sukkur, 26th October 1859.

No. 311 OF 1860.

River Improvements.

PUBLIC WORKS DEPARTMENT.

From Lieutenant C. B. F. PENNY,

Acting Executive Engineer, C. D., Upper Narra,

To Captain J. G. FIFE,

Superintendent of Canals in Sind.

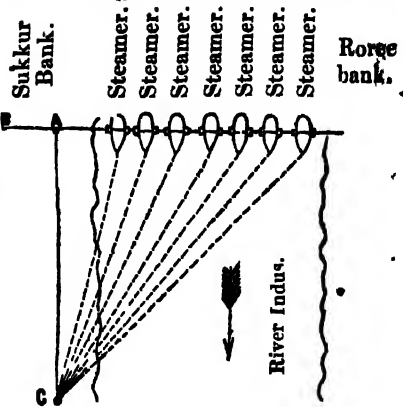
SIR,—In accordance with instructions contained in your letter No. 841, dated 3rd July 1860, I have the honour herewith to forward to you two sections of the River Indus taken on different dates—one on the 4th August, when the gauge at Fort Bukkur was standing at 11'9", and the other on the 16th, when the gauge read 12'0".

2. I would here mention that although the readings on the gauge on the two days (the 4th and the 16th instant) were very nearly alike, the state of the river on those two dates was very different: on the 4th the reading I should say was if anything over the mark, and on the 16th the river from all accounts has scarcely ever risen more than six inches higher. The reason for this inaccuracy is easily explained—on account of the great rushes that every few minutes come through the Sukkur pass during the inundation. This of course makes it very difficult to tell the true level of the river. Another reason may be that the great rush of the river at the present time is on the old Sukkur side, which of course banks up the water on that side and makes the water at the gauge lower. Last year the great rush was in the centre of the river, where the gauge is situated, and of course banked up the water at that spot.

3. In the accompanying sections are shown the surface velocities at different points across the river, and from thence has been deduced the total discharge of the Indus river, amounting on the 4th instant to 315,231 cubic feet per second, and on the 16th instant to 383,100 cubic feet per second. My observations on both days were taken with the greatest care, and the mornings on the two separate occasions were about the best I could have had for the experiment. There being hardly a breath of air stirring at the point where the soundings and velocities were observed (at the steamer bunder opposite Captain Wallace's house), there was a full steady stream right across the river, without a single eddy.

4. The following is the method in which the discharge has been deduced :

Two points, A and B, were fixed on the Sukkur bank, and at A a line was drawn at right angles to AB as far C, AC being a known distance. By means of the points A and B the steamer was put in position and anchored in the river, and bearings were taken to A and C; this gave the position of the steamer. At this point soundings and the surface velocities were taken, the latter in the following manner :—



One hundred feet were measured off on the two sides of the steamer, fixing the four points A, B, C, D. Men being placed at the points A and B told the exact moment that a piece of wood thrown into the water on the opposite side of steamer passed the points C, D, the time being accurately measured by a half-second pendulum. In this manner five or six trials were taken at every station, and the mean gave the surface at that point. Besides taking soundings at every point where the steamer was anchored, I had the lead going the whole time the steamer was under weigh.



5. If you should think it necessary to take another trial, will you kindly inform me whether you would like it made while the river is at its present height, or wait until it has fallen a little. Should you desire the former, unless you send me a telegram I am afraid it will be too late.

I have the honour to be, &c.

C. B. F. PENNY, Lieutenant,

Acting Executive Engineer C. D., Upper Sind.

Sukkur, Executive Engineer's Office, 10th August 1860.

No. 101 OF 1860.

PUBLIC WORKS DEPARTMENT.

From Captain ST. CLAIR FORD,
Collector of Shikarpoor,
To J. D. INVERARITY, Esq.,
Commissioner in Sind.

No. 422, Public Works Department, dated 13th February 1860.

SIR,—I have the honour to return the papers regarding the project for a canal from Sukkur to Shadadpoor received with your memorandum as per margin.

2. On their receipt I sent them to the Deputy Collector of Larkhana, with a general expression of my views on the subject in a demi-official form, and requested him to favour me with some information regarding the areas and revenues of the Ruttaderah and Soojawul cardarates, as these parts of the collectorate will be chiefly benefitted by Mr. Price's proposed work.

Report received yesterday (Sunday).

3. Mr. Daly has replied so clearly to my call that I beg to attach his report in original, and to state that I fully concur in all he says.

4. I have little doubt myself that the canal would turn out a most remunerative work to Government.

As said above (paragraph 2) the northernmost part of the Larkhana district will be chiefly benefitted, though the Shikarpoor and Sukkur division will also be much improved if the project is carried out.

The Ruttaderah and Soojawul cardarates are now the only parts of the Larkhana sub-collectorate that are poorly supplied with water, though, as shown by Mr. Daly, the revenues have yearly increased from such improvements as the district officers had it in their power to carry out.

5. But as a strong proof how canals do pay in Upper Sind I would refer to the other talookas in the Larkhana district.

When I took charge in 1852 of Larkhana the revenues were just 3 lakhs, though the second year they did not reach much over 2½ lakhs. For 1859-60 the estimated revenues, including the huccab collection, are over *six lakhs*, and cultivation is annually extending and will extend.

The improvements to the Ghar and the cutting of the Fordwah have chiefly caused this.

6. The zemindars are becoming many very wealthy, and would be only too happy to take up fresh land in the Ruttaderah talooka. Give them water, and the revenues will follow.

One remark more is necessary about the rates Mr. Price proposes; these I think he has pitched far too high. For the first two years twelve annas per beegah for all crops grown on waste lands would suffice, and after that take one rupee per beegah for five years, and at the end of that time experience would show what to levy in future.

I have the honour to be, &c.

ST. CLAIR FORD, Captain,
Collector of Shikarpoor.

Shikarpoor, Collector's Office, 16th April 1860

No. 84 of 1860.

Agricultural.
Irrigational Canals.

PUBLIC WORKS DEPARTMENT.

From C. DALY, Esq.,

Deputy Collector of Laikhana.

To Captain ST. CLAIR FORD,

Collector of Shikarpoor.

SIR,—I have the honour to return herewith the correspondence connected with Mr. Price's proposed perennial canal from Sukkur to Shadadpoor.

2. No one who is at all acquainted with the resources of the district which it will affect can for a moment doubt the correctness of the views set forth by Mr. Price in the 13th and 14th paragraphs of his report; and a consideration of the rapid development, both of revenue and cultivation, which has taken place of late years in the Kalladhera and Soojawul talookas, owing to the attention bestowed on the clearance and improvement of existing canals, will enable one to judge of the advantages which are certain to result from the excavation of a perennial canal like that now projected.

3. The revenue and cultivation of the two talookas mentioned above for the last six years is as follows:—

Government Revenue.

Talookas.	1854-55	1855-56	1856-57	1857-58	1858-59	Estimate for 1859-60
	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Soojawul	12,023	15,586	19,294	35,701	42,380	45,000
Kalladhera	39,237	49,999	64,363	69,871	73,541	78,940

Cultivated Area.

Talookas.	1854-55	1855-56	1856-57	1857-58	1858-59	Estimate for 1859-60.
	Beegahs.	Beegahs.	Beegahs.	Beegahs.	Beegahs.	Beegahs.
Soojawul	11,910	14,600	18,026	34,351	34,566	39,460
Kalladhera	39,989	43,200	46,563	49,644	51,945	53,081

From this it appears that the revenues of the Soojawul and Kalladhera talookas have increased 274 and 100 per cent. respectively within the short period of six years—a most favourable result, which has been brought about by augmenting the supply of water.

The existing cultivation might in time be trebled by supplying a sufficient volume of water at a level high enough to enable the cultivators to irrigate their land without having to raise the water by wheel, and this would be rendered feasible by the perennial canal.

4. When we consider that nearly the whole cultivation of the above talookas is dependent on the canals marginally noted, all of which will be crossed by the new canal, and further that the cultivation in the Khyrajeekoor, Beerajeekoor, Muksoodahwah, and Shajeekoor amounts to some 1,600 beegahs,

yielding a revenue of Rs. 18,000 to Government, the manner in which it is proposed to deal with those canals becomes a subject for grave consideration, and I may therefore be excused for hazarding a few observations on it.

5. If I understand aright it is intended to dam up the old canals at their points of intersection with the new one, and by means of escape-bridges to supply their tails with water sufficient for existing cultivation *only*. If this be so, two considerations suggest themselves:—

1st.—How will it affect the portions of those canals lying between their present source of supply and the points where it is proposed to dam them up?

2nd.—Is it expedient to limit the supply of water from the escape-bridges to what will merely suffice for the irrigation of existing cultivation?

6. The first point mooted is of no importance as regards the Khyrajeekoor and Beerajeekoor as they will be crossed close to their present heads, but the points of intersection of the new canal with the Muksoodah and Shajeekoor will be about 18 and 28 miles respectively from the present sources of supply of those canals. •

At present the amount of silt is inconsiderable, the water having a free outlet at the tails; but were the channels to be dammed up where they will be crossed by the new canal, would not the result be that a far greater amount of silt would be deposited in the portions intervening between the present heads and the dams, on which portions the greater part of the existing cultivation is dependent?

If this were the case, the increased expense of annual clearance would fall very heavily on the cultivators.

It may also be mentioned that the Shajeekeor acts as a safety-valve to the Shah-Hummeer by drawing off a large volume of water and keeping the stream at a sufficiently low level to prevent injury to the Shah-Hummeer embankments, which protect the surrounding country from submersion, and secure a revenue of some Rs. 28,000 to Government.

7. With regard to the second point I am of opinion that a large amount of land, which from its position could not conveniently be irrigated direct from the proposed canal, may be brought under cultivation by giving the existing canals an *increased* supply of water at a higher level—say from $1\frac{1}{2}$ to 2 feet above the present flood line.

The area of waste land lying towards the tail of the canals as shown in the margin, which would thus be brought under cultivation, and probably in the first year, amounts to 30,000 beegahs. The Shahjeekeor has been this season widened 4 feet throughout and deepened 1 foot by the zemindars. An increase of 3,000 beegahs in the amount of cultivation is anticipated.	
	Beegahs.
Khyrajekeor ..	5,000
Beerajekeor ..	2,000
Muksoodah	2,000
Shahjeekeor ...	11,000
Dalshjeekeor...	10,000
<u>Total .</u>	<u>30,000</u>

8. Another benefit to be derived from the proposed canal, supposing the supply of water to be sufficient, is this, that it will enable the farmers to cultivate *yearly* lands which at present require two years' fallow, owing to the scarcity means of irrigation available.

Thus the amount of cultivated land, including fallow, is about 124,500 beegahs, of which only 41,500 beegahs, or a third, are cultivated each year.

Now with a sufficiency of water such as might be supplied by the perennial canal, the *whole* of this land could be cultivated year by year, and thus give 83,000 beegahs increase of cultivation, of which about 43,000 beegahs would be irrigated from the existing koors as before, and 40,000 beegahs direct from the new canal.

9. It thus appears that an extension of cultivation on the existing canals, amounting to 73 beegahs, may be obtained, for which, according to the estimate in Mr. Price's 44th paragraph, nearly 209 cubic feet per second should be supplied to them. Whether it would be advisable or not to afford them that supply I do not pretend to decide, but I have thought it better to bring the matter to your notice.

10. In addition to the 40,000 beegahs of fallow land, alluded to in the 8th paragraph, which will be cultivated yearly, I anticipate that about 52,000 beegahs of waste land will be brought under the plough; in all an increase of 92,000 beegahs directly irrigated from the new canal.

11. There is one more point to be noticed in connection with the scheme, and that is the rate of assessment proposed by Mr. Price, viz. Rs. 2½ per beegah. Making all due allowance for the superior quality and certainty of irrigation which this canal would afford, I cannot help thinking the rate is too high to *begin with*. The farmers of the Kalladhera and Soojawul talookas are not men of capital, and I fear they could not be induced *at first*, even by the undeniable advantages of *perennial irrigation* by moke, to pay Rs. 2½ per beegah for land on the new canal, while they can obtain for from eight to twelve annas per beegah thousands of acres capable of moke irrigation for *khureef crops* lying at the tail of the Edenwah.

12. What I would beg to recommend is to fix a light assessment on waste land brought under cultivation—say twelve annas per beegah for *khureef* and the same for *rubbee* the first year, to be raised to Rs. 1 the second year, and to Rs. 1½ the third year, when the results of our experience would show whether it would be advisable or not to raise it still higher. For waste lands brought under cultivation on the existing canals I would fix the assessment at twelve annas per beegah for three years, supposing that they will have moke irrigation for the *khureef crops only*; but if the moke supply will be perennial, then I would assess them at the same rates as lands irrigated directly from the new canals.

On the fallow lands alluded to in my 8th paragraph I think an assessment of Rs. 1 per beegah would be sufficient for the first year, to be raised to Rs. 1½ in the second, and Rs. 1½ in the third years in case of the moke irrigation proving perennial. If available for *khureef crops only*, then an assessment of Rs. 1 per beegah for three years.

13. Should the assessment be fixed as above, the estimated return for the first year will be as follows:—

On existing Canals.

Waste land newly brought into cultivation, 30,000 beegahs, at 12 annas per beegah.....	Rs. 22,500
Increase of fallow land, which will be yearly cultivated, 43,000 beegahs, at Rs. 1 per beegah	43,000

On proposed new Canals.

Waste land newly brought into cultivation, 52,000 beegahs, at 12 annas per beegah.....	39,000
Increase of fallow land which will be yearly cultivated, 40,000 beegahs, at Rs. 1 per beegah	40,000

Total gross return..Rs. 1,44,500

Deducting from this the sum of Rs. 34,915, allowed by Mr. Price for maintenance, &c., we have a net return of Rs. 1,09,585, or a little over 15½ per cent. on the proposed outlay of Rs. 6,98,306.

In three years the increase of cultivation and gradual raising of the assessment will, I have no doubt, give a return even larger than that estimated by Mr. Price.

14. I think it will be found that a light assessment for the first few years will produce a much greater and steadier increase of cultivation than could be expected were the rate at once to be fixed at Rs. 2¼ (almost the highest prevalent in the most populous part of the district); the prospects of the cultivators will be bettered materially, and at the same time a fair return on the outlay will be secured.

I have the honour to be, &c.

C. DALY,

Deputy Collector of Larkhana.

Deputy Collector's Office, Camp Nyadhera, 14th April 1860.

No. 1069 OF 1861.

Agricultural.
Irrigation.

PUBLIC WORKS DEPARTMENT.

From Colonel H. BLOIS TURNER,
Chief Engineer in Sind,
To J. D. INVERARITY, Esq.,
Commissioner in Sind.

SIR,—The records of the office of Superintendent of Canals being now in my charge, I am at length enabled to reply to your letter No. 1155, dated the 4th of June 1860.

2. That letter called for my opinion on the project for improving the navigation of the Indus at Bukkur, by widening the channel to the west of the island in connection with another project for a perennial canal from Sukkur to Shahdadpoor.

3. A project had been matured and approved for constructing a locked-channel to enable steam-vessels to pass the rapids at Bukkur, but it interfered with the perennial canal scheme above mentioned to such an extent that both could not be carried out, and Captain Fife therefore, in lieu of the locked-channel, advocated widening the western branch of the Indus, and he urged reasons for preferring it to the locked-channel.

4. In considering Captain Fife's scheme for the perennial canal, it occurred to me that if the rapids were materially improved, the head of water above them would possibly be so much reduced that irrigation from canals immediately above them might be injuriously affected, and it was deemed desirable to ascertain what that loss of head would be.

5. With this view Lieutenant Penny of the Engineers was directed to take an accurate section of the river below the rapids and ascertain the velocity and discharge, so that, having sections of the rapids, the reduction of head by the proposed widening might be correctly ascertained.

6. Lieutenant Wood of the Indian Navy some years ago made the discharge of the Indus at Fort Bukkur 444,000 cubic feet per second. Captain Fife at one time believed it to be no more than 265,000, while Lieut.

tenant LeMesurier made it 365,000. It was therefore necessary for the purpose, and also of general interest, to ascertain the discharge accurately.

7. Lieutenant Penny took great pains with the experiments, and having had a steamer at his disposal, I have no doubt his results are a very close approximation to the truth. The average of two experiments taken when the Bukkur gauge stood at 12 feet gave the discharge 366,304 cubic feet per second, being very nearly the same as Lieutenant LeMesurier had made it the year before.

8. From the results ascertained it is certain that the loss of head by carrying out the proposed widening will not exceed 4 inches, which is not sufficient to materially injure cultivation, and I therefore do not consider that its interfering with the locked-channel need prevent the project for a perennial canal from Sukkur to Shahdadpore being carried out.

9. The documents received with your letter under reply are returned.

I have the honour to be, &c.

H. BLOIS TURNER, Colonel,
Chief Engineer in Sind.

Camp Kurrachee, Chief Engineer's Office, 27th April 1861.

No. 260 of 1855.

From Lieutenant J. G. FIFE,

Superintendent Narra Survey,

To Lieutenant Colonel H. BLOIS TURNER,

Superintending Engineer in Sind.

SIR,—Probably no one who has travelled through Sind can have failed to observe how singularly primitive the irrigation canals are in construction: irregular in section, circuitous in course, and destitute of any means of regulating the supply of water. But still on considering the smallness of the population and the enormous outlay required for the construction of extensive canal works on the most approved principle, the conclusion must have been arrived at that though the canals were very imperfect, they cost us little to keep them in order, and that they answered their purpose very well, because food was tolerably cheap, and the people appeared to be as well off as others of their class in other parts of our Indian possession; that it was quite true a better system of irrigation might be devised, but now that the primitive one was in existence, it would not *pay* to commence an entirely new plan; that though these rude canals were not regulated like similar works in other parts of the world, still the river rose periodically and filled them at the proper season; and that though great inconvenience must occasionally be experienced from the quantity of water not corresponding with the demand, still the system was quite good enough for the semi-barbarous Sindee.

2. I entertained these views for a long time myself. It was not until I had seen the periodical rise or inundation of the Indus for five successive years that I became satisfied that my views were fallacious, and that so far from the existing system being cheap and tolerable, it was ruinous in a financial point of view, and intolerable from its demoralising effect on the people from their being alternately successful or ruined from speculating on the cultivation.

3. The first thing which led me to believe that I entertained erroneous ideas on the subject was the effect of the high price of food in 1854 on the progress of the Narra works, which I was then engaged in superintending. Previous to that year I had been under the impression that workmen were scarce from there being no necessity for them to work regularly, a man being able to earn in two days sufficient to enable him to live in idleness for a week. When the price of food began to rise I of course concluded that the Sindee would no longer be able to idle: that he must work steadily to obtain a livelihood, and

therefore that a very great increase over the ordinary number of workmen might be expected. But the very reverse took place, and after food had risen to nearly double its ordinary price the works were almost stopped from want of workmen. Knowing that Sind exported to but a small extent, that the soil was generally good and the cultivation extensive, the question occurred to me, what becomes of the labour of the population? How is it that in a province where the soil is fertile and the population almost entirely agricultural, the whole population has to cultivate to produce enough food for home consumption? The only way of answering the question I saw was to suppose that a great part of the labour was misapplied or wasted, and my own personal observation soon showed me how this waste of labour arose. During the first inundation I saw in Sind there was too little water; during the second there had been too much; the third inundation had risen too late in the season; the fourth had subsided too early; during the fifth inundation there had been too much water; in fact that what had at first appeared to me to be an unlucky season and an exception to the general rule was really an average season and the very type of those that succeeded it. There was always something wrong: there was always too much or too little water, or the river rose too late or fell too early.

4. The accompanying sketch of the irrigation in Sind with proposals for its improvement, though perhaps rather hastily drawn up, is really the result of much careful thought and observation, and I can only hope that it may be the means of correcting in others the erroneous view of the country I so long laboured under myself.

I have the honour to be, &c.

J. G. FIFE, Lieutenant,
Superintending Narra Survey.

Hydrabad, 29th October 1855.

A SKETCH OF IRRIGATION OF SIND, WITH PROPOSAL FOR ITS IMPROVEMENTS.

Sind is an alluvial plain, almost every portion of which has at some time or other been swept by the Indus or its branches. In almost every direction traces of ancient channels are met with; and where they are large and can be traced for any considerable distance, they are most useful in indicating the relative levels of the country; for it is an axiom in plains like Sind, formed by the deposit from the river, that the land is always highest at the river bank, and low the further the bank is receded from. The cause of this is well understood: the river brings down from the hill torrents a greater quantity of detritus than its stream (moderated in velocity in the valley below) can carry forward. The result is that the bed and banks of the channel are continually rising; the bed rises most perhaps. While the inundation is subsiding, the banks are raised by the deposit from the flood water during overflow.

2. The process is a sure one, but it is very slow; for though it is now, it is believed according to tradition, about 800 years since the Indus forsook an ancient channel for its present one, the banks, which correspond with the flood-level of the river, are now only sufficiently raised above the country inland to admit of a very imperfect description of irrigation from the river being carried on. In some places the slope of the plain from the river bank is a foot per mile, in others it is only 6 inches, and where some ancient channel is met with inland, the ground is often found to be as high as the bank of the present channel, with a slight depression between the two.

3. The present course of the Indus with its branches is shown on the map. From the nature of the banks, which consist generally of a layer of clay, varying from 1 to 15 feet in thickness with loose hour-glass sand below, the river is continually undermining and carrying away the land in one place, and from the enormous quantity of sand and mud the water has in suspension, forming new land in another. These processes never cease; and the falling masses of earth make a noise, in the distance rather resembling volleys of musketry. The only points in the course of the river where the banks are permanent are Sukkur, Jerruck, and Kotree. At Sukkur the river rushes through a narrow gorge in the limestone hills, the stream being so confined by the rocks on both banks as to be a perfect rapid during the inundation, with a descent of about 4 feet. At Jerruck the river is not contracted, but there is rock on both sides. On the Jerruck side the mass of rock is very great and extends back to the limestone hills. On the opposite side there is only a small detached mass, large enough, however, to prevent the entrance

ment of the river in that direction. At Kotree there is no rock apparent at the banks of the river, but limestone hills approach near to both banks. The clay of which the banks are composed is, however, of great depth and tenacity, and no material change has occurred within the memory of man. The banks of the river everywhere else are continually being torn down by an encroaching stream, or reformed by a fresh accumulation of silt. From where the Indus enters Sind near Subzulkote to Sukkur, from Sukkur to Hyderabad, from Hyderabad to Jerruck, and from Jerruck to the sea, the channel has the same general character. The river may alter less in one place than another, but nowhere except at the particular spots indicated is there any degree of permanency.

4. But though perpetual change goes on in the channel, no change takes place in the general course of the river except at its debouchure into the sea, where it has several channels, sometimes one preponderating, sometimes another. Throughout the remainder of its course the changes are limited and alternate. For several years in succession the river attacks one of its banks and encroaches 2 or 3 miles inland, but after this it attacks the opposite bank and forms new land where it had during the preceding season destroyed the old. Anyone who has noticed the variation in the sinuosities of a river will readily comprehend this. The limit beyond which these changes do not extend varies in different places from one mile to fifteen according to the degree of tenacity of the banks. Where the clay is deep the abrasion is trifling, but where it is merely a thin layer with loose sand beneath (and nearly all newly-formed land is of this description) the changes are rapid and extensive. Where these great changes occur the river may be said to have two sets of banks—temporary banks, which are, perhaps, 2 miles apart, and which are rapidly destroyed; and permanent banks, 15 miles apart, beyond which the ever-varying sinuosities of the river rarely encroach to any serious extent.

5. The periodical rise or inundation of the Indus varies very much each season. It commences generally at the early part of May and subsides at the end of August, and though its maximum height varies very little each season, the period for which it remains at that height as well as the height for corresponding months of each year vary most materially. In the appendix will be found a statement drawn up from the register of the gauge at Fort Bukkur opposite Roree. To illustrate the irregularity in the inundation it will be sufficient to compare two seasons, 1851 and 1852. During the month of May 1851 the mean height was 7 feet 3 inches; but for May 1852 it was only 6 feet 4 inches. During June 1851 it was 7 feet 7 inches; but in June 1852 it was 12 feet 6 inches. In August 1851 the height was 12 feet, but in August 1852 it was only 10 feet 9 inches; and by taking the mean height for the whole of each season, it appears that the mean height of the inundation in 1851 was 10 feet

3 inches, but that the mean height for 1852 was only 9 feet 3 inches. A comparison of the inundations of other seasons will give a similar result, though the difference may in some cases be greater and in others less. In fact the inundation sometimes rises early, sometimes late; sometimes it subsides early, sometimes late; sometimes it is a heavy inundation, sometimes a moderate one; and no two seasons are alike.

6. The canals in Sind are nearly all precisely similar in construction: they are excavations carried away from the river in an oblique direction, so as to secure as great a fall per mile as possible; they vary from 10 to 100 feet in width, and from 4 to 10 feet in depth. None of them have their heads where the river bank is permanent, and none of them are deep enough to draw off water from the river except during the inundation. The river has to rise many feet before the water will run into them. The general direction of the canals is often good; but they have so many intermediate awkward bends that a great part of the fall is thrown away. They are irregular in shape and irregular in slope or fall. They generally very nearly follow the slope of the country, so that in some places they have a fall of one foot per mile, in others only two or three inches. In fact they resemble natural watercourses much more than canals. In some cases they are really old natural branches of the river kept open by annual clearance of the silt which accumulates in them during the inundation. They have all the same grand defects. The irregularity of their supply of water, arising from the variation of the inundation, is still further increased from the changes in the river channel at their heads, and from their becoming nearly always partly, and sometimes completely, choked with silt at their mouths. This will be readily understood by a consideration of their faulty construction. From the position of their heads they are evidently liable to two evils—either the river encroaches and tears away the bank at their heads, throwing such quantities of silt into them as materially to diminish, and sometimes even to totally stop the supply of water, or the river recedes and forms an enormous sandbank, and ultimately new land in front of their mouths. In the first case, from the setting of the stream against the bank, the canals get more water in the early part of the season; but from the silting up of their mouths, less during the latter part. In the second case the supply is more scanty, but it is more regular until totally cut off by the sandbank, as the quantity of silt thrown into the canal itself is less. The setting of the stream against the bank combined with the endless alterations that take place in the bed of the river sometimes cause a difference of 2 feet in the level of the water at particular spots, and from this and the actual difference in volume of the inundation each season, previously explained, a most extraordinary difference is caused in the quantity of water which enters the canals. From the shallowness of the canals a dif-

ference of two feet in the inundation causes a difference of, perhaps, not less than one-third of the whole supply drawn off by them; yet each season the supply actually required for irrigation is the same.

7. The irrigation carried on by means of the canals may be classed under three heads according to the elevation of the land. *First*, there is land on to which the water will not run without the aid of machinery. *Second*, there is land which is watered with the aid of machinery while the supply in the canal is low, but on to which the water will run without a lift when the canal is full. *Third*, there is land which is so low that after the canal is three parts full, the water can be run off without a lift, no machinery being ever used. The cultivation carried on on the three classes of land may be thus briefly described:— In the first case the cultivator has his cattle and servants ready by, perhaps, the 15th of May to commence working the water-wheels, ploughing, and sowing; but as the supply of water is dependent on the rise of the inundation, it never comes on the same date for two successive years, and of course his cattle and servants are kept idle till it does arrive. When the water at length makes its appearance work is commenced with activity and carried on steadily, unless, from the river suddenly falling, the supply of water should be cut off, in which case of course there is an interruption, and the cattle and servants are again idle. After this a second subsidence of the river is rare, and the work proceeds steadily, but it also proceeds slowly. The rate at which the sowing is carried on is dependent on the number of bullocks the cultivator can procure, and of course as at this period most of the other cultivators are similarly circumstanced, it is difficult to procure a sufficient number; the land is so hard and dry that it must be watered before it can be ploughed; time creeps on, and before he has sown all his land the best period for sowing is past. However, as he commenced early, a very small portion only of his crop is poor from late sowing, and on the whole the crop is good, unless, from the early subsidence of the inundation in August, he has experienced difficulty in getting his water-wheels to throw up sufficient water, a subsidence of 3 or 4 feet in the level of the water doubling the labour and expense, and halving the speed at which the irrigation is carried on. Should this early subsidence take place, some of his crop will be inferior from being insufficiently watered.

8. In the second case, where the land is partly watered by machinery and partly without, the cultivator also awaits the arrival of the water with his servants and cattle, and is, during the early part of the season, subject to the same losses and interruption. Later, however, he finds that the water is sufficiently high to run on to the land without a lift, and he therefore stops his wheel and employs all his cattle in ploughing. The sowing progresses rapidly, but a great part of it is late. Matters progress favourably till the river begins to subside, when a difficulty immediately rises: the river falls, perhaps, three

inches only, but the canals, owing to the mouths choking, fall a foot, and the water will no longer run on to the land without a lift. The wheel can do little more than water the land sown with its aid. The remainder of the crop suffers from want of water, and what was sown immediately before the water subsided utterly fails.

9. In the third case, when the land is irrigated without the aid of machinery, the cultivator rarely commences till late in the season, as the canal must be nearly full of water, and this does not take place till the inundation period is half over. A great part of the crop is sown too late, and when it is jowaree or badjree, blight very frequently destroys it. This description of cultivation is, moreover, exposed to two most serious risks—either the water begins to subside too early (and two or three inches of subsidence renders it impossible to water the land), or from some unexpected rise in the river a greater quantity of water comes into the canal than can be used; it bursts its banks, and of course this description of land, which is always low, becomes inundated, and the crop is partly if not totally destroyed.

10. The results of the three classes of cultivation may be thus briefly summed up:—

The first class is on the whole good, but it is very expensive from the heavy expense attending the raising of the water, which costs almost Rs. 2 per beeguh, or nearly twice as much as the land-tax the cultivator pays to Government.

The second class is inferior but less costly, the facility for irrigation being greater.

The third class is very inferior from the many risks to which it is exposed; but from the great facility there is for irrigation it costs very little,—little or no capital is necessary to start with, and it is extremely popular among the poorer classes.

11. With the cultivation exposed to so many risks, arising from the capricious nature of the water supply, it cannot be a matter of wonder that the people should look on the cultivation as a species of lottery: they are successful one season, and bankrupts the next; no one who sows can tell what he will reap. Too little or too much water, the supply coming too soon or too late, and the blight arising from sowing at the wrong time, combine to render speculation on the result of the cultivation a riddle which none can solve. From the very frequent failing of crops, the cultivators on the whole are very poorly repaid for their labour; but this does not prevent them from forsaking regular and fairly-paid-for occupation for the cultivation. They may win if the capricious river only furnishes the proper quantity of water at the proper time to suit the particular class of land on which the venture is made.

Gamblers are aware that gaming-houses are supported by their losses, and therefore that in the long run the chances are in favour of their losing; but this does not prevent gambling among civilised people. Need it therefore cause any surprise that the semi-barbarous Sindhee should forsake regularly-paid employment for the cultivation, though on the whole the latter may be the least remunerative, even supposing he should be aware of this, and very likely with so many chances for and against him he is not aware of it.

12. It will be interesting now to compare the quantity of produce which ought to be derived from the cultivation in Sind with the quantity actually produced in order to ascertain what this deplorable system costs the country. In doing this, accuracy can hardly be looked for, but a very tolerable approximation to the truth may be made. In Upper Sind it is well known that a crop of jowaree on average land sown at the proper time, and receiving a sufficient quantity of water at the right time, will yield 15 maunds of grain per beegah, but that owing to the many risks to which the cultivation is exposed, the average crop is not more than 10 maunds. In Lower Sind it is also well known that though a crop of rice under equally favourable conditions will yield 14 maunds, the average yield is not more than 10 maunds; hence the losses amount to about one-third of the whole produce, and are therefore about equal to the Government share, the average value of which is Rs. $1\frac{1}{2}$ per beegah. Now the total number of beegahs irrigated, according to the statement in the appendix, in 1853, when there was, if anything, less cultivation than usual, was 1,438,000, exclusive of the cultivation on wells, which is always good; 1,438,000 beegahs at Rs. $1\frac{1}{2}$ each = Rs. 17,98,000, which therefore represents what the cheap canals cost Sind in loss of produce in that year.

13. There is, however, another charge which the country has to pay—this is the cost of raising water, which varies from Rs. $1\frac{1}{2}$ on canals to Rs. 4 on wells. From the statement in the appendix it will be seen that the total number of beegahs cultivated with the aid of machinery on canals was, in 1853, 697,780, and on wells 65,091. Charging for these numbers of beegahs at the rates mentioned, we have—

Cost of raising water from canals for 697,780 beegahs, at Rs. $1\frac{1}{2}$ each	Rs. 10,46,670
Cost of raising water from wells for 65,091 beegahs, at Rs. 4 each ..	2,60,364
Total....Rs.	<u>13,07,034</u>

Adding the last amount to value of the produce lost, we have a total of Rs. 31,05,034. So that Sind in 1853 suffered a loss of about 31 lakhs of

more than the whole revenue of the province, from a defective system of irrigation.

14. That the country should be paying so heavily from the defects in the irrigation system can cause little surprise after a consideration of the circumstances under which the people cultivate as previously explained. There are some confirmatory facts, however, which it may be worth while to mention. In Sind nearly the whole male adult population cultivates; there are very few indeed who do not, either directly or indirectly, share in the labour. Now we know that the country is fertile from the splendid crops which are often raised, and which produce even more than a kurwar or 20 maunds of grain per beegah, yet it appears from the export and import "returns" in the appendix that our exports exceed our imports by only 413,000 maunds, the value of which is about Rs. 4,13,000, or a seventh part of the revenue, and therefore only one-twentieth part of the produce of the country. If the whole population cultivates and the land is fertile, both of which are well known facts, how does it happen that our exports are so small; how does it happen that we import at all; what becomes of the labour of the whole of the population? In fact while we have the clearest evidence of the fertility and capabilities of Sind, we have equally clear evidence of those capabilities being thrown away from a defective system of irrigation.

15. The direct loss to the country has been shown to be enormous; but it, perhaps, does not exceed the indirect loss arising from the same causes. It is clear that where the number of risks to which the cultivation is liable is such that a careful cultivator has but little better chance than a careless one, all enterprise must be annihilated. A man who knows that his crop depends entirely on the capricious inundation, and that though he may expend great labour on it, it will avail nothing unless he gets the supply of water at the proper time and at the proper level, naturally expends as little labour as possible on it. This of course gives rise to careless cultivation. This imperfect cultivation, and the large area which fails yearly from causes previously described, give rise to another kind of loss. The fertility of the soil is exhausted in producing a crop of straw without any grain; and putting aside the immediate loss, there is loss which is certain to occur the next season from the sowing of land previously weakened. This occurs year after year, and the loss caused must be enormous. In fact in the preceding calculations of what the country loses in produce, it would, perhaps, have been more just to have taken what is considered a first-rate crop in Sind, than merely a remunerative crop for the standard. Another effect of the system is the proverbial improvidence met with in the Sindian. How can he be expected to be otherwise? One year he is successful, the next he is ruined; he is nearly always in debt and difficulty; he is continually paying 100 per cent. for

borrowed money, and much of his time and ingenuity are consumed in devising plans of escaping payment. In fact it may be said of the whole population that while the Hindoos who lend the money in the first instance are employing all their cunning to get back their money and interest, the Mussulmans are employing theirs to avoid payment. A volume might be written on the various ways in which the present deplorable system of irrigation affects the prosperity of the country, but this brief notice of them will suffice to show that the indirect loss is scarcely less than the direct loss shown in figures.

16. It is a common complaint in Sind that labour is scarce and dear; but surely no one who may read this sketch can fail to perceive the cause. In England and other prosperous countries skill and machinery enable one man to do the work of ten. Now, assuming that one-third of a population should with ordinary means cultivate sufficient grain for the whole, it is plain that in Sind three men do the work of one.

17. Doubtless there may be inaccuracy in the foregoing calculations. To those well acquainted with Sind many instances will occur in which the risks to which the cultivation is exposed are not so great as represented in this sketch; occasions will be remembered when the quantity of water exactly met the demand, and when it came at a convenient time. It must be remembered, however, that the calculations given are only intended as an approximation to the truth—that there is no general rule without some exceptions; and allowing the widest margin for inaccuracy or error, it is surely evident that the general conclusions arrived at are perfectly true.

PART SECOND.

The conclusion having been arrived at that the country is labouring under disadvantages sufficient to crush the most industrious race in the world, the all-important question arises, what can be done to relieve it?

2. There can be no question that until the irrigation system can be remodelled the most beneficial thing that can be done will be to have the present canals properly cleared and even deepened at their mouths, as it is a well known fact that the country at present suffers oftener from getting too little water than too much. Until we can construct new canals the most must be made of existing ones. The construction of works calculated to effect any permanent good to the country must occupy many years, and in the meantime we must have water. But beyond the proper clearance of the present defective canals nothing should be done except what may eventually form part of the improved system. Making new canals on the old pattern, which has been shown

to be mischievous to almost an incalculable extent, would be a mere waste of time. There must be some exceptional cases, however, where from changes in the course of the river or from some extraordinary radical defect in the canal, a new cut near the head may be necessary. The expense, the time likely to be employed, and the advantage to be gained must determine in each case whether such cuts are desirable works. Generally speaking it will be found better to clear the original ones, because, as the beds of the canals are already near the *constant* level of the river, 1 foot of excavation at that depth is equal in effect to 10 at a higher level. As the present canals would be very much too large if kept constantly full, as it is to be hoped they will be some day by an improved system, it would also be a waste of time clearing them at any great distance from their mouths, unless there should be some extraordinary impediment which checks the flow of the water as far up as the head, or in other words causes a diminution of the supply entering the head. This clearance of the present canals, with the addition of regulating-sluiques to the heads of the larger ones to prevent too much water entering after they have been deepened, comprises all that can be done towards the amelioration of the evils inherent to the system; we may therefore now proceed to consider the best method of effecting any permanent good.

3. The requirements of a canal are—*first*, that it shall contain a stream which may be increased or diminished at pleasure according to the demand, and quite independent of the changes of the river; and *second*, that it shall feed or supply the water at a proper level—that is a little higher than the level of the land to be irrigated. To meet these requirements it must be evident that the following conditions are essential:—

1st.—That the head of the canal must be situated at a point where the river bank is permanent, where the shape of the mouth can be preserved, and where there is no liability of having the mouth masked by a sandbank after the inundation subsides.

2nd.—It is essential that the stream in the canal should have sufficient velocity to sweep along the silt thrown in by the river to prevent its choking rapidly.

3rd.—That in a country like Sind, with a very gentle slope, there must be room to carry the canal along at a slope somewhat less than that of the country till it feeds at the requisite level, even supposing the river whence it derives its supply to be at its lowest level, or, as this is technically termed, there must be room to gain “a head of water.” This distance will be very considerable in Sind, even in the case of a large canal, which requires the smallest amount of slope. The distance will, perhaps, be not less than 30 miles, up to which the water will be below the surface of the

ground; beyond it will be at the proper level. Besides these conditions there is one axiom which must not be forgotten, as in Sind it is of very great importance: this is that the larger a canal is, the less slope it requires to ensure a stream of the requisite velocity. The importance of this fact cannot be over-estimated, for in Sind we have a most serious difficulty to encounter, arising from the large quantities of mud and sand the river water carries along in suspension at all seasons, and which render the strong stream, which can only be obtained in a large canal, essential. A large canal with a fall of 6 inches per mile only will run much faster than a small one with a fall of even a foot per mile. There is another fact which also deserves notice here, and this is the immense value of large canals traversing a great extent of country for the purpose of navigation.

4. With these conditions and axioms before us little time is needed to decide on the best plan for irrigating the country. The rocky banks at Sukkur and Roree and 250 miles lower down at Jerruck, with perhaps the strong clay bank opposite Hydrabad, are the proper points for canal heads. Of these Sukkur and Roree are the best, because there is more room to carry canals along till a head of water is obtained for the irrigation of the land to the south. Canals to contain a permanent stream might be carried from those two points. At Hydrabad and Jerruck however, from there being a greater difference (18 feet) between the inundation and lowest level of the river, from the country having less slope, and from their being less room to gain a head, perennial canals would not be so easy to construct—at least canals to remain constantly full and to feed at a *proper level*; canals to be quite full for, perhaps, eight months in the year, and partly full for the remainder, could be made and would suffice for the cultivation in Lower Sind.

5. In deciding on the lines for these canals, of course advantage should be taken of any existing canals which may have the desired direction for main-trunk lines, and all the minor canals which the proposed new canals will cross should be used as distributing branches.

6. The lines which appear best suited for irrigating canals are indicated on the map in red. That from Roice runs in a curve nearly parallel to the river but about 15 miles inland, to be quite secure from any encroachment of the river. It passes for about 50 miles through the possessions of His Highness Meer Ali Morad, and between Roree and Hydrabad it crosses about 150 canals, small and large. Near Hydrabad the main line enters the Foolahie (a natural stream), but only kept open for irrigation by annual clearance at its head, and below this point the Foolahie, now only containing a stream for a few months

in the year, and subject to all the disadvantages of the other canals, would become the trunk line for a distance of about 80 miles. The numerous small canals crossed between Roree and Hyderabad would answer as distributing branches to the new trunk canal. In this way all the present canals would be most useful. Only a portion of them (perhaps one-fourth of the whole number) would be used at the same time, because, as previously explained, they are much too large, supposing them kept constantly full. If all were made to flow constantly they would inundate the whole country. They are not too large for their present uncertain supply of water because it only lasts for a very short period in each year. In fact the present canals have to afford in four months a supply of water which they would hereafter have to afford in twelve. But this will be no disadvantage. Some of the canals may be used as escapes, and the others may be worked at different periods of the year according to the nature of the soil near them; some of them may be best suited for the spring, others for the autumn crop; and while some are being used, the others may be undergoing clearance and repair. It would be necessary on the completion of the new trunk line to regulate the supply entering the present heads of the old canals; the only water required from them would be enough to water the narrow strip of land between the new trunk line and the river, and which would, perhaps, be most valuable for forests.

7. The line of the canal from Sukkur also runs parallel to the river but clear of its encroachments. About 16 miles below Sukkur it crosses the Ali Burh canal, which runs from the river into the "Sind" canal. Further on it crosses the "River Gharr," which, like the Foolalie, is an old natural channel, kept open for irrigation by an annual clearance of the head. Ultimately the line enters the Western Narra, a natural branch of the Indus, which rejoins the main stream at Schwan. As in the case of the Roree line, the whole of the present canals would be used as distributing branches to the new trunk line. The Gharr and the Narra in their present state, for reasons already explained, would be very much too large for perennial streams; but this objection might be obviated by throwing dams across them at intervals to bring the water up to the proper level and check its too rapid escape; the dams would of course be placed at the points where the principal distributing branches are thrown off.

8. The line for the canal opposite Jerruck runs nearly parallel to the river, and crosses the "Pinyarre," a natural branch, which it would of course supply with a large volume of water during the inundation for the rice cultivation, and a small quantity during the cold season for other crops. After crossing the "Pinyaree" the line runs parallel to the river, supplying all the canals at present receiving their supply direct from the river. This canal, as previously explained, would not remain constantly full the whole year round. It would

be full for six or eight months in the year, but during the cold season it would only contain a comparatively slender stream.

9. The line of the canal on the Jerruck side runs parallel to the river like the others, supplying all the present canals. The strip of land between the river and the new canal might be used for forests. From Tatta the present "Kulleeree" canal or a new cut would afford a passage for boats at all seasons as far as "Goojah," and from the latter place a canal might be carried to Kurrachee on the line recommended by the late Lieutenant Chapman of the Engineers. The canals from Jerruck, like the one on the opposite bank, would carry a large volume of water for the rice cultivation during the inundation, but in the cold season a much smaller quantity, though sufficient for the passage of boats to and from Kurrachee.

10. The lines of the whole of these canals have been determined, not from the result of a survey, but merely from a general knowledge of the features of the country. They have been carried as near the river as the constant changes in the channel will permit. The object of this is to bring as much land as possible under the influence of the proposed improved irrigation as well as to secure an uniform slope or fall for the canals. The river banks are supposed to be higher than any other part of the country, and by carrying the trunk lines along them, of course the whole of the country except the strips of land near the river is brought under their influence. Careful surveys may, however, very likely show the desirability of some modification of the plan. As an instance it may be mentioned that it is well known that the land indicated by the red-dotted line south of Roree is high, much difficulty being now experienced in carrying the present canals across it, some of the cuttings being 17 feet deep. After the levels have been ascertained, it may very likely appear preferable to carry a large branch in the direction of the dotted line to water the high land without a lift, than to water it from the present deep canals with the aid of machinery. The red-dotted line corresponds very nearly with the line of an ancient channel of the "Indus" called the "Pooran" and which is still distinctly traceable. The land along the bank of this ancient channel forms a kind of ridge which near Roree is as high as the present bank of the Indus. It may also be found better to furnish the supply to the canal opposite Jerruck, by means of a head near Hydrabad, in order to have more room to gain a head; and in the same way with the Jerruck canal, it may be found better to take the supply from Kotree for the same reason. These modifications are shown by red-dotted lines.

11. There is one other line for a canal which is likely to prove very beneficial to the country, and which it is to be hoped will very soon be undertaken by Government, the survey having been made. This is the line from Mitrow

to Wanga bazaar on the Eastern Narra. The nature of the ground is very favourable for the construction of a canal, with a fall of about 6 inches per mile. The head will be situated at the edge of a very large swamp, many miles in area, and which will be converted into an enormous reservoir by the construction of a dam along its south and east sides. The supply of water will be derived from the Eastern Narra, the new head to which is already in progress.

12. A reference to the conditions and axioms on which this system of canals has been recommended will show that the proposed lines attain for us all that we require—permanent heads for the canals, large canals to ensure a strong stream, abundance of room to obtain a head of water, and, with the aid of the present cross canals, a complete system of water communication throughout the country.

13. Before any proper estimate can be made of the cost of any of these works, of course accurate surveys must be made; but in the meantime sufficient is known of the country and the costs of similar works for making an approximate estimate of one of these grand works; the canal from Roree for instance. At the spot suitable for the head of the canal in the rocks at Roree the river has a rise of 12 feet from its cold weather or lowest level to its inundation or highest level, the fall per mile being about 8 inches. At Hydrabad the fall is only five inches, and taking the mean between these, and also allowing for the gain in fall from the canal being less tortuous than the river, we may take seven inches a mile as the average fall for the canal. The quantity of cultivation at present carried on in the Hydrabad collectorate amounts to about 767,000 beegahs; and supposing that we merely provide for this, allowing the Mitrow canal and the rubbee land near the Narra and Indus to provide for the increase, which is certain to take place when the facilities are improved, we shall require, according to Colonel Cautley's estimate that one cubic foot per second constant is sufficient for the cultivation of 350 beegahs of land, a canal to discharge 2,200 cubic feet per second at its head. With a fall of seven inches a mile, the dimensions of the canal to discharge this quantity of water will have to be 90 feet wide at bottom, 117 at water line, and 9 feet deep, giving a sectional area of 932 square feet, the mean velocity of the stream being about $2\frac{1}{2}$ feet per second. Now the total length of the canal, from its head at Roree to where it enters the Foolalie at Hydrabad, will be about 200 miles; and assuming that for the first fifty miles through Meer Ali Morad's territory no water is required, and that the expenditure of water is pretty equally distributed over the whole remaining length, including the Foolalie, which is 80 miles long, the quantity which enters the Foolalie will be 775 cubic feet per second, to convey which the canal will have to be about 56 feet wide at bottom, 74 at water line, and 6 feet deep at its terminus, giving

a sectional area of 390 square feet. Taking a mean between the sectional areas at the head and at Hyderabad, or 661 square feet for the average sectional area from the point where the canal leaves Ali Morad's territory to Hyderabad, and making a deduction of one-sixth from this, from the canal being partly excavated and partly embanked, which can be easily managed in a country with a regular slope, the estimate for the earthwork will be as follows :—

Excavation for the first 50 miles from the head to where it leaves Ali Morad's territory; the sectional area 932 square feet and uniform, the rate being Rs. 4 per 1000 feet—

$$\frac{932 \times 5280 \times 50}{1000} = \dots\dots\dots \text{Rs. } 9,84,192$$

Excavation from Ali Morad's boundary to the Foolalie at Hyderabad, mean sectional area $661 - \frac{661}{6} = 551$ square feet, the rate being Rs. 3 per 1,000 feet—

$$\frac{551 \times 5280 \times 150 \times 3}{1000} = \dots\dots\dots 4,36,392$$

Total....Rs. 14,20,584

But to this an addition must be made to cover the extra depth of excavation at the head to secure a supply of water when the river is at its lowest level. The extreme extra depth required for the purpose will be 12 feet, and in this particular case it will diminish to nothing at a distance of about 25 miles, giving a mean depth of 6 feet. This increase of depth on a length of 25 miles and a width of 135 feet will give, at a rate of Rs. 4 per 1000 feet—

$$\frac{6 \times 135 \times 5280 \times 25}{1000} = \dots\dots\dots \text{Rs. } 4,27,680$$

Adding this to the former total :..... 14,20,584

We have a grand total for excavation of 18,48,264

For our masonry works, as we have no proper examples in Sind, we cannot do better than take the requisite information from the cost of similar works on the Ganges canal, making allowance for the difference in the dimensions of the works and for the difference in price of labour which in Sind is about one-third dearer :—

Regulating-bridge at head	20,000
Lock at head	75,000

Carried over....Rs. 19,43,264

Brought over....Rs.	19,43,264
Masonry heads to branches including the Foolalie 200, at Rs. 500 each	1,00,000
Village regulations or modules for sale of water by measurement, at Rs. 60 per cubic foot of discharge, 2,200 cubic feet, at Rs. 50 each	<u>1,10,000</u>
Total....Rs.	21,53,264
To this total 20 per cent. must be added for contin- gencies and establishments.....	<u>4,30,653</u>
Making a grand total of Rs.	<u>25,83,917</u>

Now the annual cost of the work will be as follows :—

Five per cent. on Rs. 25,83,917, the original outlay for the use of the capital	Rs. 1,29,196
Three per cent. on ditto for repairs of works and es- tablishments.....	77,517
Costs of annual clearance of the silt deposited in the main canal and branches, but principally the latter, the same as at present, the body of water being supposed to be the same	<u>1,30,000</u>
Total annual costs....Rs.	3,36,713

And as the total number of beegahs watered will be 767,000, the charge per beegah will be seven annas yearly.

14. In the estimate the rates allowed for the work are extremely high, being higher by nearly one-third than those at which the works on the Eastern Narra are being excavated. The object of this is to prevent delay in the execution of the works by paying such a price for labour as is certain to draw together a sufficient number of workmen. The estimate of the annual cost of the canal is also high. On the Ganges canal the cost of repair and establishment is estimated at 4 per cent. on the original outlay ; but on that magnificent work the greater part of the expenditure was owing to the extraordinary difficulties that had to be overcome. The principal part of the expenditure was made on masonry works which require continual repair. In the canal from Roree the principal expenditure is for simple excavation, which of course needs no repair. Yet 3 per cent., almost as much as for the Ganges canal, has been allowed for annual repairs and establishment. A most liberal allowance has been made also for annual clearance. In the present canals a great deal of the clearance becomes necessary from the stream in them continually varying in velocity. When the river falls and the quantity of water entering the

canals diminishes, the velocity of the stream is immediately reduced, and silt and even thin mud are deposited. But in the plan proposed for the Roree canal this would not take place: the canals would be kept running at their full velocity as long as they might be required, after which the stream would be at once stopped. In our estimate, however, the expense of annual clearance has been taken at what it now costs.

15. While the estimate for the works is liberal, most liberal allowance has also been made in the general design for any ordinary contingency. It has been assumed that until the canal leaves Ali Morad's possessions it will not be used for irrigation, except in furnishing a small supply equivalent to what is now drawn off from the river by his canals during the inundation. For the first 50 miles of its course the canal is supposed to yield nothing, though it would entail no additional expense to furnish a very large quantity of water for Ali Morad's lands over and above the quantity now drawn off from the Indus by his canals. It would simply be necessary to open an extra gate in the regulating-bridge at the head of the canal for about eight months in the year or as long as the river might be above its lowest level. The conditions under which the project has been drawn up are not so favourable as they might be. The object of thus allowing a high estimate of expenditure and a moderate return is to give a moderate view of the merits of the proposals, and not to mislead in a matter of such vital importance.

16. Similar estimates might be prepared of the cost of the other canals proposed, which would furnish a similar result, viz. that water might be delivered at a convenient level and at the proper time for a very moderate charge per beegah.

17. The only points that now remain for discussion are—*first*, whether, considering the difficulty under which the country labours from waste of labour, it is possible to carry out works on so large a scale as those proposed; and *second*, whether the country could afford to pay the increase of taxation for the improved supply of water.

18. The first of these questions appears to be the most difficult to answer; but that it can be answered will presently be seen. The instance commonly referred to as one showing that large works cannot be carried out in Sind for want of labourers is the Narra canal at Roree, the argument used being this, that if that canal can only be formed at the rate of 2 miles a year, how is it possible that a canal 200 miles in length can be finished in a reasonable period? Now though this reasoning appears unanswerable, the fact is that the case of the Narra canal cannot be compared to that of a canal like that proposed from Roree to Hyderabad on the estimate given in the preceding pages. In the first place the estimate for the Narra was made on the assumption that

a sufficient number of labourers could be procured at 2 annas a day. Secondly, it must be remembered that the population of Sind is scattered over a large area, so that to collect a large number of men they must be brought from an average distance of 50 miles, leaving their homes and families, for they have a great dislike to moving the latter; and in the third place the Narra canal is twice as large as the canal proposed from Roree, at its head even, the former being 155 feet wide at bottom and 16 feet deep; the latter only 90 feet wide at bottom and 15 feet average depth. When the Narra was commenced the effect of these circumstances was very soon noticed. It was found that though 2 annas a day was sufficient for people who had not to travel any distance to the work, and when food was cheap, it was not sufficient for people who had to come a long distance, and who of course lost two or three days' work every time they visited their families; and that when food was dear, 2 annas a day was insufficient for labourers living even close to the spot. It was also noticed that from the position of the work near the edge of the Eastern Desert, and with a thinly-populated tract to the north, labourers were only procured from two directions—the south and west. Thirdly, it was found, from there being so large a quantity of work to do in one spot, the forage required for the cattle employed became exhausted before the season was over. Not long after the commencement of the work the price of grain and other kinds of food began to rise, and in the course of a few months it had increased by one-half. This affected the progress of the work in two ways—first, it was no longer worth a man's while to travel thirty miles to the works; and second, the increased price of grain held out a higher prize to those inclined to speculate on the cultivation. The result was that the work was nearly suspended. After this the rate of remuneration was increased by one-third, and as might be expected an immediate improvement took place, and the works continued to make steady though not rapid progress. But had the rate of wages been still further increased, there can be no doubt that the progress would have been more rapid. Now the canal from Roree to Hyderabad differs from the Narra in every important particular. The canal where it is largest at its head is only about one half the size of the Narra canal, and consequently there would be less demand for labour at any particular spot. The workmen would have less distance to travel, and the forage each season would last longer and remain cheaper. The further the canals leaves Roree, the smaller it becomes in section, and the smaller the demand becomes for labour at any particular place. The necessary number of workmen would be obtained close to the canal to complete it in a few years. The line of the canal will run through the best populated part of Sind; and in addition to these advantages, the rate of remuneration to workmen allowed in the estimate is one-third more than the increased rate of pay given to the Narra workmen.

Surely there cannot be a doubt that the works would progress at such a rate as to be ready in five or six years. If any should doubt the possibility of carrying out so large a work, it would be a fair question to ask him how all the existing canals were made. Some of these canals are as large as the mean section of the proposed canals. They are not so long certainly, but the length of the canals is of no great importance: the demand for labour is scattered over a large extent of country, and there is little difficulty in meeting it. The canals, small and large, in Sind may be counted by the hundred; and putting aside the minor canals as necessary in any case for distributing the water, the quantity of excavation in the main feeders would suffice to make, perhaps, treble the number of properly-constructed canals required to water the whole country on the most approved plan. Every main feeder is not less than six times the size it ought to be, supposing it kept constantly full of water, instead of as at present containing an ever-varying stream for four months in the year. Yet all these canals with their innumerable branches have been made by former Governments. A great many, perhaps nearly all these were made by forced labour; but it does not follow from this that works not demanding a greater amount of labour cannot be done by paid labour. The reasonable inference is that if it was possible to execute such large works by forced labour, it would be much easier to construct similar or even larger works by paying a proper price for it.

19. There is of course one inference which is perfectly true respecting the effect of paying a high price to induce some portion of the population to leave off cultivation—gambling and to work at the canals—there will be less land cultivated, and some loss of revenue must occur till the new works are completed; but with the country in its present condition, is it reasonable to expect that improvement can be effected without some sacrifice in the first instance? Would it be throwing away revenue to consent to a reduction for a few years to secure some permanent good to the country, and as a direct consequence a permanent increase of revenue? These are questions which none should find difficulty in answering. But supposing any one should doubt as to the proper answers, it may be worth while to glance at the immediate effect of drawing a portion of the population away from the cultivation to estimate as nearly as we can what it will cost in loss of revenue. It is self-evident that the people who may be drawn off from the cultivation would be those who, either from the inferiority of the land they are in the habit of cultivating, from the uncertainty of the supply of water, or from their own bad management, are least successful, and whose labour in producing crops is therefore of least value to the State. But of these even it is curious how few will suffice for carrying out the proposed works. We may take the canal from Khorra as an instance. The cost of the excavation has been esti-

mated at about Rs. 18,48,000; and supposing one-fourth of the work to be done by cattle as on the Narra, and the people to be remunerated at the rate of $4\frac{1}{2}$ annas a day, including cost of tools, &c., the time employed to be five years, and three-fourths of the work in Ali Morad's possession to be performed by people drawn from the Hyderabad collectorate, we should require the services of 2,300 men each year, or only about a one-hundredth part of the male adults, who by the last census numbered 219,000. The land revenue of the Hyderabad collectorate is about eight lakhs of rupees; and assuming that four-fifths or 174,400 of the male adults cultivate, and that the number required for the canal 2,300, or one seventy-sixth, belong to the average class, even and not the worst as was shown to be likely, the loss of land revenue would evidently be a seventy-sixth part of 8 lakhs or about Rs. 10,000 per annum, making a total loss of Rs. 50,000 for the five years occupied in constructing the canal.* The loss of revenue is but a small fraction compared to the cost of the work, and might be added to the estimate without producing any great difference.

20. Having thus established the truth that workmen may be obtained for the canal without interfering to any material degree with the cultivation, we may now proceed to the second question proposed—as to whether the country will be able to bear the increased taxation of 7 annas a beegah to cover the cost of the increased supply of water. There might have existed some doubt as to the possibility of carrying out works on so large a scale with a scarcity of labour, but certainly there can be none as to the advantage that would be derived from them on their completion. Under the present system the cultivator pays a land rent of Rs. $1\frac{1}{2}$ for every beegah of land irrigated. His crop, as was shown in a former part of this sketch, is rarely sown at the best time, and is subject to so many accidents that though its produce ought to be 15 maunds, worth Rs. 15 a beegah, it is really only 10 maunds, worth Rs. 10. In addition to the land tax the cultivator has also to pay what may properly be called the cheap canal tax—the cost of raising water with machinery from the level of the canal. This amounts to about Rs. $1\frac{1}{2}$ per beegah, or rather more than the tax he pays Government. The effect of the improved irrigation would be to save the cultivator this expense for raising water Rs. $1\frac{1}{2}$, and increase the value of his crop from sowing at the proper time by Rs. 5, making a total saving or gain of Rs. $6\frac{1}{2}$, and out of this we have merely to ask him to give us 7 annas. In some of the cultivation (that cultivated at present without the aid of machinery) nothing it is true will be saved to the cultivator for raising water, but then his crop receives even a greater gain than in the case just described. If his expenses are less, but from the risk being greater, his profit is no greater than that from land watered with the aid of machinery. All these risks (too much or too little water, and sowing

at the wrong time) will be removed, and the cultivator will, as in the former case, have the value of his crop enormously increased, for which he will only have to pay 7 annas. No doubt in some places on the *river* side of the proposed new canals (for instance where the land rises from the canal) the water even from the improved canals will not run on to the land without a lift; but then the lift will be very small, and it will be constant; it will not vary from 2 to 10 feet as in the present canals, rendering it impossible for the cultivator to rely on his machinery being equal to watering the whole of his crop and annually causing an enormous loss. The water will remain at a fixed level—perhaps 2 feet, perhaps only a few inches below the level of the land to be watered. The cultivator will be able to water his crop at the exact time it requires it; and putting aside the great saving from having only to raise the water perhaps a foot instead of 4 or 5 feet, the more punctuality in watering the crop would cause a sufficient increase in the produce to far more than cover the additional tax of 7 annas the cultivator will be called on to pay.

21. In considering the question as to whether works on so large a scale as those proposed would afford a remunerative return, the immediate pecuniary gain alone has been examined. No account has been taken of the indirect advantages which would be certain to arise. Under a proper system the labourers would separate into classes. Instead of having the whole population attempting to cultivate under great disadvantages as at present, and labour for other purposes scarce, we should have a portion cultivating and a portion employed in other ways, each from habit becoming skilled at its particular occupation; and instead of the people being careless and improvident, they would be frugal and careful. The saving of labour resulting from each class being skilled at its occupation would alone be equal to relieving the country of half its present taxation; and the frugality of the people would enable them to turn their skill to the best account. Just as under the present system the indirect disadvantages are equal to or greater than the direct pecuniary loss, so under an improved system the indirect gain would be equal to or much greater than the direct pecuniary gain. In fact while the condition of the people would be improved to almost an incalculable degree, the revenue obtained by their labour might be doubled or trebled. Who can doubt but that with a fertile soil, extensive irrigation on the best plan, navigable canals running through the most highly-cultivated districts, affording the cheapest possible transit for the surplus produce for exportation, and with a naturally hardy, energetic, and intelligent people, Sind would become as fertile and prosperous as any country in the world.

Recapitulation of Totals of Population in the three Collectorate of Sind as per last Census.

Collectorate.	Number of Souls.						Other Persons not detailed in last Census.	Grand Total of all.	Camels.	Horses.	Cows and Oxen.	Buffaloes.	Mules and Donkeys.
	Children.		Persons of full Age.		Old Persons.								
Males.	Females.	Males.	Females.	Males.	Females.								
Kurrachee ..	50,729	43,633	114,664	94,303	8,220	7,671	6,698	325,918	24,005	10,145	210,787	55,908	20,904
Hydrabad. . .	118,086	90,161	219,149	175,706	15,422	16,888	....	635,412	43,352	17,790	423,589	49,491	36,273
Shikarpoor ..	91,218	68,698	178,827	139,959	18,851	21,935	....	519,488	14,603	13,672	319,166	59,163	23,642
Total..	260,033	202,492	512,640	409,968	42,493	46,494	6,698	1,480,818	81,960	41,607	953,542	164,562	80,819

Mean height of the River Indus for the years—

Months.	1848		1849		1850		1851		1852		1853		1854		1855	
	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.
May.....	6	8	6	7	5	3	7	3	6	4	4	9	6	2	4	7
June.....	10	..	10	6	7	6	10	2	7	7	9	7	9	1	6	1
July.....	10	1	9	7	8	11	11	8	12	6	11	6	12	9	10	8
August.....	11	..	12	..	11	6	12	..	10	9	10	2	12	6	9	4
Total....	37	9	38	8	33	2	41	1	37	2	36	1	40	7	7	8
Mean height of Inundation for each year.....	9	5	9	8	8	3	10	3	9	3	9	0	10	1	7	8

*Statement exhibiting the average excess of Grain Exports over Imports for the
years 1851-52, 1852-53, 1853-54.*

PROVINCE.	Excess of Export.	Excess of Import.	Remarks.
	Maunds.	Maunds.	
Kurrachee	12,282 $\frac{3}{4}$	.....
Khetty.....	488,473	.....
Sukkur .....	.....	87,729 $\frac{1}{2}$	
Kippra.....	40	.....
Omerkote .....	.....	3	
Total....	500,795 $\frac{3}{4}$	87,732 $\frac{1}{2}$	
	Maunds.	Kurwars.	
Total Exports over Imports.....	413,063-26-2	or 20,653 $\frac{3}{8}$	

Abstract Statement showing the extent of Irrigation of each of the three Collectorates in Sind.

Collectorate.	Number of Water-wheels.	EXTENT OF IRRIGATION.				Total	Remarks.
		Number of Beegahs cultivated with the aid of Machinery.	Number of Beegahs cultivated unaided with Machinery	Number of Beegahs cultivated after the subsidence of inundation on land subject to complete submersion.	Number of Beegahs cultivated by Well		
Kurrachee.	8,773	87,656	316,710	154,601	18,202	577,169	
Hydrabad	34,012	465,899	196,101	90,249	14,973	767,222	
Shikarpoor	4,655	144,225	227,877	246,197	31,916	650,215	
Total..	47,440	697,780	740,688	491,047	65,091	1,994,606	

RESOLUTION by the HONOURABLE BOARD, dated the 22nd May 1861.

The great obstacle to all increase of revenue in Sind is its scanty population. However abundant the supply of water may be, still the area that can be cultivated by the inhabitants is limited by their number, and the general effect of providing water for cultivating land not already irrigated is a mere transfer of cultivation from lands indifferently watered to such as enjoy a more certain, a larger, or a higher level supply.

2. The last named advantage (a high level supply) is as a general rule the only one which greatly increases the revenue. If a man can cultivate a given area when he has to raise the water, say three or more feet, it is obvious that if he can obtain water by a smaller expenditure of labour, or better still, without raising it at all, he can cultivate a very much larger area. Improvements therefore which afford a high level supply of water directly meet the great obstacle to an increase of revenue by enabling one man to do the work of many.

3. Captain Fife's irrigational projects not only supply water at the proper level, but ensure that supply, however low the Indus may be, for ten months of the year.

4. There can therefore be no doubt that if capital invested in such works will return a revenue considerably greater than the rate of interest at which money can be obtained, the larger the sum which can economically be so laid out the better for the revenues of the state.

5. These views I expressed when Captain Fife first proposed his system of canalisation in 1855, but then, as now, I foresaw that there were difficulties to be overcome, some of which are fully discussed in the documents now circulated. There are others relating to channels for distributing the water and to prejudices to be overcome, and the economical use of water to be introduced, the first of which affects the present project less than any other of the larger schemes, and for that reason, and also because the project now under consideration involves a comparatively small outlay, I should be glad to see it carried out as a pioneer to the larger undertakings.

6. The second project referred to in these papers is for diminishing the difficulties of navigating the dangerous rapids at Fort Bukkur, and is proposed to supersede that for a locked-canal which was entered in the budget for 1857-58 as No. LVIII. The simplicity of the work, the ease with which it could be carried out, and the absence of all subsequent expense for maintenance are strong reasons for preferring this to the project for the same object before proposed. The estimated cost of the former in 1856 was Rs. 1,78,971; that of the latter is Rs. 2,05,984. But as it is extremely doubtful whether the former could now be carried out for the amount of the original

estimate, there will probably be no material difference in the expense. The correspondence explains that if the locked-canal be carried out, the proposed irrigating canal from Sukkur to Shadadpoor must be abandoned; on that account alone the revised project should be preferred.

7. I beg to propose that the two projects be approved, and that they be transmitted to the Government of India with a summary of the correspondence, and a letter recommending their sanction whenever the finances of India will admit of their being commenced.

No. 2713 OF 1861.

PUBLIC WORKS DEPARTMENT.

To the SECRETARY to the GOVERNMENT OF INDIA.

SIR,—With reference to paragraph 3 of the letter from this department (No. 1431, dated June 1859), submitting certain proposals by Sir H. B. Frere for the systematic canalisation of Sind, and of subsequent correspondence regarding the projects of the Desert and Mitrow canals, I am desired by His Excellency the Governor in Council to transmit herewith for submission to the Government of India plans and estimates for the construction of the undermentioned works :—

The improvement of the channel of the Indus at Sukkur by removal of a portion of its right bank so as by reducing the velocity of the current to facilitate the passage of boats and steamers; estimated cost Rs. 2,05,994.

Formation of a perennial canal from Sukkur to Shadadpoor; estimated cost Rs. 7,29,820.

2. I am also desired to annex a copy of a letter from the Commissioner in Sind (No. 125, dated 30th April 1861) and a summary of the correspondence relating to these works.

3. Both these projects have been approved by His Excellency in Council, and I am desired to convey the recommendation of this Government that they may be duly sanctioned by the Government of India, their commencement being deferred until the finances of India will admit of their being carried out. Papers to accompany the letter to the Government of India :—

1 map	} Sent per steamer in a tin-case.
2 plans	
7 plans in a tin-case.....	
2 estimates and a memorandum of bench-marks	

No. 4409 of 1861.

Communications.
Navigable Canals.

PUBLIC WORKS DEPARTMENT.

From Lieutenant Colonel H. YULE,

Secretary to the Government of India,

To the SECRETARY to the GOVERNMENT of BOMBAY,

in the Public Works Department.

SIR,—I am now directed to reply to your letter No. 2713, dated 15th July, forwarding the papers connected with two projects that have received the approval of the Bombay Government. These are—

I. A canal from Sukkur to Shadadpoor, 63 miles long, on the right bank of the Indus, estimated to cost Rs. 7,29,820.

II. Improvement of the navigation of the Indus by cutting away the right bank and thus widening the channel between Bukkur and Sukkur; estimate Rs. 2,04,985.

2. The object in now submitting them is to obtain sanction to the designs and estimates with a view to commencing the works when the completion of more pressing works will allow of money being allotted to them.

3. The projects have received the careful consideration of the Government of India. Both, especially the canal project, have been got up with much care.

4. There is, however, a want of full information regarding the floods which in former years were caused by the overflow of the Indus, and which crossed the site of the canal between the 12th and 17th miles in 1857 at a depth of 7 or 8 feet. The means of passing these floods (possibly silt-bearing) over the bed of the canal by sloping off lengths of its banks, with a stop-gate down stream, appeared in the absence of information very hazardous. But the Government has had the advantage of Sir Bartle Frere's advice, based on personal knowledge, and under the information so derived, as to the absence of silt, the slight current, &c., it appears to the Governor General in Council that there is no need to refer the project back. It is therefore sanctioned without reserve.

5. The second project is in substitution of a lock-channel already sanctioned at an estimated cost of Rs. 1,78,971, but which if executed at present rates would cost Rs. 2,16,000. The present plan will cost Rs. 2,05,985, and will involve no future expense for establishment to work the locks, &c.

6. This enlargement of the channel will, it is anticipated, reduce the velocity of the current from $6\frac{1}{2}$ to $4\frac{1}{2}$ miles an hour. The Governor General in Council believes the plan to be a sound one. Even if the effect on the current be less than is expected, the facility it will afford for warping up boats, as compared with the Roree channel, will be very great.

7. The designs and estimate are approved.

8. The plans and estimate are retained.

I have the honour to be, &c.

H. YULE, Lieut. Colonel,

Secretary to the Government of India.

Fort William, 16th December 1861.

**SELECTIONS FROM THE RECORDS OF THE BOMBAY
GOVERNMENT. .**

No. LXX.—NEW SERIES.

P A P E R S

RELATIVE TO THE INTRODUCTION

OF

REVISED RATES OF ASSESSMENT

INTO

THE MAWUL TALOOKA

OF THE

POONA COLLECTORATE.



Bombay:

PRINTED FOR GOVERNMENT

AT THE EDUCATION SOCIETY'S PRESS, BYCULLA.

1863.

From Captian J. FRANCIS,

Superintendent Poona and Tanua Revenue Survey,

To E. C. JONES, Esq.,

Collector of Poona.

SIR,—I have the honour to submit a report explanatory of the new rates of Assessment which I propose to introduce throughout the Mawul Talooka, comprising altogether 180 Government villages.

2. This talooka, occupying the south-western corner of the collectorate, has a considerable extent of frontier boundary. Its western border, which meets the Tanna collectorate on the summit of the Syhadree ghauts, extends along that range for a distance of upwards of 30 miles. On the south it is bounded by the territories of the Punt Suchew, belonging to the Sattara zillah; but on its eastern and northern sides it is surrounded by the Hawaillie and Kheir talookas, both of which have been already settled, and will therefore, as regards their rates of assessment, form a standard of comparison by which my present proposals may be tested.

3. In its general features the Mawul talooka is very similar to the ghaut districts which have been already reported on. The hills which intersect it are not, perhaps, quite so extensive as they are in other districts, if we except the range on which the forts of Lohoghur and Veasapoor are situated; the valleys also are generally more open, extensive, and far more level. We have a striking example of this in the part of the district traversed by the mail road from Poona to Bombay. The level plain that I allude to commences about 3 or 4 miles from Khandalla, and stretching across almost to the foot of the hills which overlook the road on each side, it extends to within a short distance of Wurgäum, which is one of the eastern villages of the district. The western parts of the

mahalkurry's division must, however, be excepted from the above description, as the country is, perhaps, more rugged and undulating in that direction than in any part of our ghaut districts.

4. The chief products of the jerayet lands are nachnee, sawee, and teel for the khureef crops, and wheat and gram for the rubbee. Bajree and jowaree are cultivated to a small extent in a few villages on the eastern border. Black soil lands are only suited for rubbee crops.

5. Rice is the crop from which the cultivators pay their revenue. It is for the most part sent to the Poona market. Some little goes below the ghauts, and a smaller portion is kept for retail sale at the great halting-places along the line of road, of which Wurgaum and Khandalla are the chief.

6. Manure is not applied to any lands in this district, except that which they receive from the process of burning brushwood and grass—a practice which is confined to the spots on which the young plants of rice, nachee, &c. are raised for transplantation purposes.

7. I have explained the measures adopted for the revision of the former survey of this district in my progress report for the season of 1851-52. The result of the test on the work confirmed and on that which was executed anew by our department is therein detailed. In part, however, of the mahalkurry's division the revision was not carried out till last season, and not completed till the present in a few villages; but as this work will come under review in the report for the year, it does not appear necessary to give any details on the subject in this place. I beg to observe that I have examined the test of it, and am happy to add it exhibits a satisfactory result.

8. The classification has been a new work throughout. It was carried out partly during the past season, but not completed until the beginning of this month. The supervision of the work was entrusted to Mr. Hexton, Sub-Assistant Superintendent, who has had very great experience in classification, and is, in my opinion, well qualified for such a duty. The district I consider a difficult one to classify, and to this I attribute the circumstance of the error in the test being greater than in the case of the adjoining talooka of Kheir. The

average error made up from the rough returns is six pies in the case of jerayet, and nine pies in the case of rice lands. I have myself personally tested some of the villages, and my own work confirms the above result, which I consider to be very satisfactory.

9. With regard to the classification of rice lands I was of opinion that some modification of the Nassick dang system, which is that which had heretofore been adopted, was advisable in the case of a district like the Mawul talooka. I consulted Captain Wingate on the subject in March 1852, and obtained his full approval to the system introduced. The modification consisted chiefly in the substitution of a valuation regulated by the description of rice which the field is capable of producing, in place of a separate valuation of the "jheel" and embankments. For the classification of the soil, Mr. Tytler's plan was retained. Captain Wingate refers to this

Memorandum on the classification of rice lands appended to Mr. Tytler's report on the settlement of Kownace talooka, dated the 19th April 1841.

subject in his report in review of the survey of the kharapats of Colaba. The following are his remarks:—"The system of classification described in Mr. Jones' 13th paragraph seems well adapted to the lands to which it

has been applied, and the Revenue Survey Commissioner submits this opinion with the more confidence from having been lately engaged with Lieutenant Francis, the Superintendent of the Poona Survey, and afterwards with Lieutenant Kemball, on special duty in Rutnagherry, in considering the best system of classification for rice lands, when they came to the conclusion that the particular kinds of rice grown upon the land were among the best characteristics for determining its class, and they are so used in Mr. Jones' system." Captain Wingate's testimony in favour of the system is fully borne out by my own experience of its practical working.

10. In this district, notwithstanding it is a "Mawul" or rice-growing one throughout, there is a considerable difference in the climate, which is indicated by the variation in the fall of rain in different parts. I need scarcely say it is much heavier in the immediate vicinity of the ghauts than in any other part. The plan therefore on which the adjoining districts have been divided into

classes for their jerayet rates of assessment will be applicable in this case. I propose consequently to have four classes of rates, which I would apportion in the following manner:—

1st class rate of Rs. 1-8.—To be applied to the villages on the extreme eastern border of the district, touching on the part of Kheir talooka, in which rates of Rs. 1-8 were introduced last year, and on the Hawaillee talooka assessed at Rs. 1-6, which I consider equivalent to Rs. 1-8 of my classification. (See paragraph 18 of report on Kheir district).

2nd class rate Rs. 1-6.—To be applied to the group of villages lying immediately west of the foregoing. These have no bajree or jowaree cultivation, which does exist to a small extent in the 1st class villages.

3rd class rate Rs. 1-4.—To be applied to a group west of class 2nd. The cultivation in these villages is generally non-continuous.

4th class rate Rs. 1.—To be applied to the villages lying along the crest of the ghauts and the sides of the hills. Cultivation is non-continuous throughout.

This system of applying the rates seems to have given general satisfaction in the ghaut districts that have been lately assessed, and I feel every confidence in its suitability to the case now under consideration.

11. The villages situated along the line of the Bombay road, or at a short distance from it, derive a considerable advantage from the sale of grass for the numerous droves of cart and pack bullocks that are daily halting at the different stages on the road. This consequently makes their “mal lands” more valuable. I have considered this circumstance in fixing the class for such villages, and have therefore brought some of them adjoining the ghauts (Khandalla for instance) into the 3rd in place of the 4th class rates.

12. The considerations on which the rates of assessment for jerayet lands have been lowered for each group of villages in proportion to its proximity to the ghauts would naturally suggest the application of the same system in the reverse manner in regard to rice cultivation, and therefore that our highest rice land rates should be applied where

the lowest jerayet are and *vice versa*. This rule does not, however, hold good in the case of this district, as the best rice lands are not found in the ghaut villages, nor are the least productive generally to be found in the most easterly group. The midland portion of the district has certainly the most productive lands, both in the mamlutdar's division and the petta also. There are, however, in the latter many very capital rice villages which come into the 1st class for jerayet rates.

13. What I propose then is to have 4 classes of rates for rice lands, viz Rs. 4-8, Rs. 4, Rs. 3-8, and Rs. 3, which I would distribute in the following manner:—

The rate of Rs. 4-8 to the villages of the petta falling into the 1st and 2nd classes for jerayet lands which have the best rice lands of the district.

The rates of Rs. 4 and Rs. 3-8 to the villages of the petta falling into the 3rd and 4th classes for jerayet lands, and to all of the 1st, 2nd, and 3rd classes of the mamlutdar's division.

The Rs. 3 rate to all the villages of the 4th class belonging to the mamlutdar's division which have the least productive lands of the district.

I have made a few exceptions from this general classification, sometimes by applying the higher and at others the lower rate of the adjoining class. I trust this exercise of judgment will not be objected to, especially as it has been regulated by local knowledge.

14. Having explained the rates for both kinds of cultivation (there is not, I should observe, any baghaet in the district), we may proceed to notice the result which they are calculated to effect.

15. We shall be assisted in doing so if we review in the first place the working of the settlement which is now in force. This it will be seen is most fully set forth in the diagrams introduced in the report. They are prepared generally in the usual manner; but as it seemed very desirable to have the revenue for rice and jerayet cultivation separately exhibited, I have to this end divided the column for each year into three divisions, representing respectively the jerayet and rice cultivation and the two combined, each division being differently coloured, and having its extent of cultivation and

the remission for the year marked off in its respective column. There is a diagram for each division, and one for the two combined. In the case of the Moolsee petta there has been an annual deduction from the assessment on account of what is termed "pal-nook" (which I shall allude to afterwards); but as the deduction has been regularly made, I have considered it would be better to exclude the amount of it from the diagram. If introduced it would have to appear under the head of remission, and would thus be swelling that head with an item which does not come under the denomination of remission, it being in effect a lower rate of assessment for such lands.

16. The small amount of remissions in this district is very remarkable. They amount to just five per cent. of the full assessment for the twenty-three years, being the whole period that Mr. Pringle's settlement has been in operation. This, coupled with the steady increase of cultivation which has been taking place for the last ten or twelve years, affords good evidence that the present assessment is a favourable one. For the last two years the cultivation and revenue have exceeded any former year's return. I attribute this increase of cultivation to the expectation of the survey rates. Some of the Belgaum districts, I believe, furnished some very remarkable instances of extension of cultivation in anticipation of the survey rates, and I have no doubt the present case is attributable to the same cause.

17. With respect to the present condition of the cultivators, I regret to say I cannot speak favourably of it. The villages along the Bombay road are filled with Marwarrees who have managed to get the great body of them deep in their books, and to such an extent that I am afraid they are more oppressed with debt in that part of the mam-lutdar's division than in any other district of the collectorate. I think this argues rather in favour of the assessment being light than otherwise; for the Marwarree being a keen calculator would not, it may be inferred, be so ready with his loans to the ryots were it not that land, which is the usual security for the payment of the debt, holds out a good remuneration in case he is thrown upon his security for the liquidation of the debt. He or his agent may generally be seen lurking about the ryot's stackyard when any thrashing is going

on, ready to step in and carry off the promised portion of the produce. I have heard that a new usury law is under the consideration of Government. Some change in existing practice is urgently called for in respect to this district.

18. I do not therefore, it will be observed, attribute the somewhat depressed condition of the cultivators to the heaviness of the present assessment. We have happily in this same district evidence to the contrary in the case of the Moolsee petta cultivators, who are in circumstances of comparative prosperity and well-doing, and yet their rates are heavier than in the mamlutdar's division. Their rice land is better certainly, but the difference in the condition of the two cultivators is chiefly owing to this one circumstance—that they (the Moolsee petta cultivators) pay their revenue from *bonâ fide* sales of grain, whereas the other party look to the Marwarree for the payment of it. This fact is very significant as regards the amount of assessment which may now be safely imposed on the district.

19. It will be seen from the diagram that the revenue derived from the district is as follows:—

On the average taken for twenty-three years it	
has amounted to	Rs. 48,325
On the average taken for last ten years do...	51,909
Last year's revenue is	58,234

In the statements appended I have calculated the amount which the proposed rates will realise on the extent of last year's cultivation and on the whole area of the arable land. In the former case it is Rs. 52,888, whereas Mr. Pringle's rates on the same amount to Rs. 58,447, thus showing a reduction of Rs. 5,559, being at the rate of about $9\frac{1}{2}$ per cent. This reduction will appear small when contrasted with the effect of the revised settlements introduced in some of the open districts of the collectorate, but I am persuaded it will be found sufficiently liberal, especially when we consider that it is in a percentage form nearly double the amount of the remissions for the whole period (see paragraph 17), and moreover exceeds those given during the last ten years by $8\frac{1}{4}$ per cent., as in the latter case they have amounted only to about $1\frac{1}{4}$ per cent.

20. The reduction again is divided amongst the mamlutdar's and mahalkurri's villages in the following manner:—

For 100 Villages of Mamlutdar's division.

	Jerayet Land.	Rice Land.	Total.	Differences.
By present rates . .	16,579	17,867	34,446	
By proposed rates . .	14,001	17,853	31,854	
			<hr/>	2,592

For 78 Villages of the Petta.

	Jerayet Land.	Rice Land.	Total.	
By present rates . . .	5,474	18,527	24,001	
By proposed rates	3,164	17,870	21,034	
			<hr/>	2,967
				<hr/>
				5,559

It will be observed that rather a large part of this reduction falls to the jerayet lands of the mahalkurri's division. This, I should explain, is attributable to the circumstance of a considerable extent of jerayet land being brought to account under the *present rates* as in cultivation last year, consisting of Nos. situated in the hills and only occasionally cultivated, whereas the same land is not included under the estimated revenue by *proposed rates* in consequence of its not having been measured off into Nos. at the recent survey. On a consultation with Captain Wingate it was deemed advisable to include land of this description in the ghaut villages within the limits of the hill lands undivided into Nos. or fields for cultivation. The assessment for it will be collected under the provisions of Rule 13 of the survey administrative code. The sum that will thus be collected should therefore be added to the amount realisable under *proposed rates* in order to form a correct contrasted statement between the two assessments. I have not the means of ascertaining what this revenue will amount to until the jumabundy papers are prepared, but I have mentioned the circumstance as explanatory of the apparent great reduction under this head, which, it will be seen, is unavoidably represented to be in excess of what it will actually amount to.

21. In rice cultivation the reduction is small ; but as I have before mentioned the lands are of good quality generally in this district, especially in the petta. The new rates give an average of Rs. 2-4-3 to the acre for the mamlutdar's and Rs. 2-15-2 for the mahalkurry's division, and of Rs. 2-8-11 for the two combined.

22. There are altogether 180 villages in the two divisions ; but as two of them (Nigree and Nasawee) did not come into the possession of Government till 1847-48, they have been omitted from the diagram and the contrasted statement given in foregoing paragraph. Bringing them to account, we shall have the following as the amount of assessment on last year's cultivation :—

By present rates.....	Rs. 59,358
By proposed rates.....	53,947
	<hr/>
Difference	Rs. <u>5,414</u>

The general result given in a preceding paragraph may therefore be safely taken as the effect of the rates on last year's cultivation, for the difference shown by including these two villages is too small to be of any consequence.

23. The new kumal or the full assessment by proposed rates on all the arable land of the district amounts to Rs. 70,564. There is therefore a considerable margin of waste from the cultivation of which the present reduction may be made good. If we set apart 10 per cent. of the above sum to cover the revenue of the lands periodically left fallow (the extent of which included in the kumal is small as shown in paragraph 21) and other contingences, it will leave about Rs. 63,000 as realisable revenue, whereas Rs. 58,234, collected last year, is the largest amount that the district has yet paid. I consider therefore that the proposed settlement holds out a good prospect of remunerating Government for the expense incurred in the preliminary survey and classification of the district.

24. As a further proof in support of my proposals I would beg to draw your attention to the following statement, exhibiting the working of the revised assessment in eleven villages of the Hawaillee talooka which adjoin the eastern part of the Mawul district :—

Statement showing the working of the Revised Settlement in Eleven Villages of the Hawaillee Talooka since its introduction in Fuslee 1251.

Revenue years.	Government Land under Cultivation.		Remissions.	Balance, being the Revenue realised.	Government Waste Land.	
	Acres.	Assessment.			Acres.	Assessment.
1251	7,013	5,269	219	5,050	2,513	1,114
1252	8,350	5,865	..	5,865	1,238	531
1253	8,845	6,062	..	6,062	743	361
1254	8,328	5,837	..	5,837	1,267	588
1255	8,281	5,846	..	5,846	1,283	577
1256	8,310	5,927	..	5,927	1,070	460
1257	8,455	5,991	..	5,991	923	395
1258	8,657	6,082	..	6,082	746	324
1259	8,971	6,273	..	6,273	704	309
1260	9,016	6,315	..	6,315	658	266
1261	9,143	6,367	..	6,367	531	214
1262	9,280	6,383	..	6,383	445	186
Total..	102,599	72,217	219	71,998	12,121	5,325

The rates were introduced twelve years ago, at which time there was an extent of 2,513, assessed at Rs. 1,114, lying waste; but at the present period the assessment of the waste land is only Rs. 186, which, taken with reference to the kumal or total assessment of these villages, amounts to a little above 2 $\frac{1}{4}$ per cent. Excepting the first year not a single rupee of remission has been given. This is a very satisfactory result indeed. We cannot, however, expect the proposed rates to be attended with the same measure of success; for it must be borne in mind that there is not an inconsiderable extent of land belonging to the Mawul talooka which is unsuited for continuous cultivation.

25. The next subject that I have to refer to is the "palnook" tenure, which is in effect a reduced rate of assessment for lands cultivated by Brahmins and other influential classes. The tenure obtains in the mahalkurry's division only. I have not been able to trace its origin; but from Mr. Pringle's remarks in his report dated 6th September 1830 on this district, it would appear to have existed from a remote period. The following are his observations on the subject:—

“35. In some villages in these valleys, and chiefly in Powar Khora, a tenure exists somewhat similar to what I have understood to be that of the pandurpeshas in the Concan, by which Brahmins and the common officers and servants of the village and some other persons specially privileged enjoy their lands at a reduced assessment under the name of palnook, which generally consists in an exemption from the extra puttee for huks, village expenses, and other babs to which the common ryots are liable.

“36. No specific written grants are produced in support of this privilege; but it appears from the village accounts and the evidence of the people to have existed from a remote period; and the concurrence of the ruling power may be inferred from a sunnud of one of the early Rajas of Sattara, in answer to a petition which appears to have related to this subject, confirming in general terms such privileges as the petitioners were entitled to by usage.

“37. The names of the persons holding under this tenure and the extent of their lands seem occasionally to have varied; but it is not clear whether the privilege was understood to extend to whole classes or only to individuals, and whether, as regarded the land, it was general or confined to specific portions. The holders of course contend for the most extensive interpretation; but I am well informed that under the former government this was never admitted in practice, and in the absence of any direct proof to the contrary, I think it may be fairly presumed that there was some limitation, expressed or implied, to a claim which might otherwise have gone to reduce the whole revenue of the country by having land entered in the names of privileged holders and sub-rented to others.

“38. This tenure, whether originating in views of personal favour or of general improvement, operates like most bounties, either uselessly or perniciously, and is therefore not one which on general principles it would be desirable to introduce or extend; but where it already exists and is supported by long usage, it could not be set aside without injustice. I am therefore of

opinion that it should be confirmed to the persons by whom it is now enjoyed, and for the land which they now occupy, but that its further extension should be precluded by distinct limitations : and I have reason to believe that this arrangement would be readily acceded to by the individuals themselves.

“ 39. With a view to the settlement of the claims of palnookdars on this principle, I have caused an accurate register to be made of their names and holdings as they now stand, with a reduction on the survey assessment of each in the proportion which his present payments come short of the present full rate ; and if the arrangement should meet with the sanction of the Honourable the Governor in Council, I will deliver it to be acted upon along with the other accounts. The number of palnookdars according to this statement is 196 ; the full amount of their survey assessment is Rs. 8,673 ; and the reduction is Rs. 3,662.”

26. The reduction on the survey assessment of each individual, to which Mr. Pringle refers in his 39th paragraph, was effected by calculating the value of the “ babs,” from the payment of which the palnookdar was individually exempted. The sum thus found was deducted from the regular assessment by a percentage rate equivalent to its amount. From this information a statement was prepared, giving the names of the palnookdars and the reduction each was entitled to ; these statements are still in existence. They are in fact the documents on which the reduction has been annually made.

27. Mr. Pringle states Rs. 3,662 ankosee, or about 3,510 Company’s rupees, to be the full reduction under this head at the time of his settlement. It amounted to Rs. 2,605 on the extent of last year’s cultivation, and the accounts also show Rs. 581 falling to lands lying waste, thus making Rs. 3,186 the full amount of the deductions from the present assessment under the head of palnook. The difference between these sums, viz. Rs. 324,* falls to lands which have in

* Mr. Pringle’s statement.	Rs. 3510	the interval been brought under the
Last year’s account	3186	full Government assessment, the right
	<u>Rs. 324</u>	to the palnook deductions being for-

feited by the transfer of occupancy, the death of the original palnookdar, or by some such contingency. In many of these cases

I believe the parties interested will set up a claim to the original palnook.

28. Government has under its consideration a report of Captain Wingate's, forwarding extracts from a letter I addressed to him regarding the "pandurpesha" tenure in the Concan which is very similar to the "palnook." In submitting his opinion on the subject, Captain Wingate recommends either the entire abolition of this class privilege, or its continuance in a modified form to those parties only who were in possession of it at our occupation of the country. The measure I had ventured to recommend was its continuance to those now in the enjoyment of the privilege; not, however, in the form of a lower rate as is now the practice, but on the plan by which the jooree payments were fixed in the Southern Maratha Country, viz. the privilege of continuing their old payments when the same fell short of the new assessment, and of paying according to the latter whenever it was less than their former payments. Captain Wingate considers that this plan of settlement would concede much more than is desirable, and recommends in the *strongest* terms the entire abolition of the pandurpesha tenure. In case, however, Government should consider it expedient to make some "temporary concession" to the pandurpesha class, he suggests the arrangement explained in the following rules :—

"15. I do not think it necessary to make even a temporary exemption in favour of any pandurpesha, let his claims be what they may, or that prejudicial consequences to the survey of much moment would result from making the whole class subject to the ordinary survey assessment, just as the ordinary ryots will be. But if Government deem it desirable to make some temporary concession with the view of conciliating the class and promoting the immediate popularity of the survey settlement, then I would suggest that the land now held by pandurpeshas at the lower rate and that portion of their land only be treated as land held on cowle has been treated at the introduction of the settlement above the ghauts. I would suggest the following rules for disposal :—

"I. When the survey assessment of a pandurpesha's whole holding shall not exceed the total assessment now paid

by him, the survey rates would of course be applicable to his whole land without exception, just as by your proposal.

“ II. When the survey assessment of a pandurpesha's whole holding shall exceed the present assessment of the same, the excess shall be rateably apportioned on the part of his holding subject to the ordinary rate, and that held at the lower privileged rate and the portion assigned to the latter be temporarily remitted on cowle for a term of years on the following or other conditions approved by Government.

“ III. When the pandurpesha is the same individual who held the land at the accession of the British government, the remission in question to be for a term of *ten years*.

“ IV. When the pandurpesha is the son or direct descendant of the pandurpesha who held the land at the accession of the British government, the remission to be for a term of *five years*.

“ V. In all other cases, including those of pandurpeshas who have obtained their lands subsequent to the accession of the British government, no remission to be given, and the survey assessment to be levied in full without reference to its being less or more than the existing assessment.”

“ 16. These are the utmost privileges that I would concede to any of the pandurpesha class, which in my opinion possesses no valid claim upon Government for any exemption of assessment whatsoever under the survey settlement.”

29. I incline to the opinion that it would be expedient to make a temporary concession of the nature contemplated in the rules in place of the entire and immediate abolition of the tenure. Supposing such a mode of settlement to be adopted, I think a modification of Rule 3 is required, and would suggest that the remission for ten years which is therein granted should be applicable in the case of the palnook of this district to the parties in possession of the privilege at the time Mr Pringle's settlement was introduced, and again that Rule 4 should include the sons or direct descendants of the same. There is, as I

have before had occasion to mention, a statement prepared by Mr. Pringle giving the names of the palnookdars and the extent of land in respect to which the right to hold at the reduced rate of assessment was conceded at the introduction of his settlement; this then I would respectfully suggest should form the basis of the settlement according to Captain Wingate's rules.

30. There would be no difficulty in carrying out such a measure, but what its effect would be cannot be ascertained till the rates are being introduced, when I would suggest the preparation of a statement contrasting present palnook payments with the survey assessment, and showing the remission to which each party is entitled under the foregoing rules. The settlement for the current year's revenue should, I am of opinion, be made according to present payments, except in cases where they exceed the survey assessment, when the latter should be paid and the palnook tenure extinguished according to Rule I. And again the amount which may be remitted on account of the survey assessment being in excess should be entered as remission "on account of increase over former assessment" in the manner that is adopted with other cultivators' payments for the year the rates are introduced.

31. The transmission of this report has been delayed somewhat beyond the usual time. This was, however, unavoidable, for the classification of the district was not completed till the early part of this month, and as the calculations for the new assessment are obtained from this operation, the materials for exhibiting the effect of my proposals were not consequently available until that operation was completed. I would beg the favour of your earliest attention to the subject in order that the report may be speedily submitted for the orders of Government.

32. I beg further to intimate that I shall be prepared to furnish you with copies of the diagrams for the records of your office.

I have the honour to be, &c.

J. FRANCIS, Captain,

Supt. of Poona & Tanna Revenue Survey.

Tanna Districts, Camp Ghasna,

31st January 1854.

MAMLUTDAR'S

STATEMENT *contrasting present and*

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 25 years.					Assessment on last Fuslee		
		Jerayet.	Rice.	Total.	From Kooruns, Grazing Lands, and Dulce Cultivation.	Total.	By present Rates.		
							Jerayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Shewna.....	235	400	635	9	644	312	485	797
2	Beberwohole.....	333	62	395	28	423	518	72	590
3	Pachaneh	347	268	615	83	698	441	293	734
4	Purundowndee....	199	64	263	8	271	236	76	312
5	Reheh	283	496	779	52	831	309	513	822
6	Chand Kheir	610	328	938	67	1,005	841	387	1,228
7	Adaileh Khoord ..	355	21	376	56	432	450	27	477
8	Mungrool.....	229	11	240	18	258	293	13	306
9	Khatwee	99	11	110	8	118	139	12	151
Grand Total..		2,690	1,661	4,351	329	4,680	3,539	1,878	5,417

DIVISION.

proposed Rates for the Villages of Class 1st.

year's Cultivation, 1909.			Details of New Measurement and Assessment.						Estimated Revenue from Kooruns, Grazing Lands, and Dullee Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jerayet.		Rice		Total.			
Jerayet.	Rice.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
346	360	706	1,199	493	159	364	1,358	857	25	882
394	108	502	1,027	485	49	112	1,076	597	50	647
402	304	706	1,275	513	157	346	1,432	859	137	996
202	91	293	802	356	47	105	849	461	..	461
312	696	1,008	944	390	404	708	1,348	1,098	64	1,162
915	333	1,248	2,890	1,189	209	334	3,099	1,523	..	1,523
307	161	468	1,416	559	87	168	1,503	727	16	743
127	27	154	1,175	446	16	30	1,191	476	19	495
82	9	91	423	227	6	9	429	236	14	250
3,087	2,089	5,176	11,151	4,658	1,134	2,176	12,285	6,834	325	7,159

J. FRANCIS, Captain,
Superintendent of Poona and Tanna Revenue Survey.

MAMLUṬDAR'S

STATEMENT *contrasting present and*

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jerayet.	Rice.	Total.	From Koorun, Grazing Lands, and Dullee Cult- vation.	Total.	By present Rates.		
							Jerayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Thoogaum	73	305	378	6	384	90	336	426
2	Mulowlee	51	162	213	6	219	103	180	283
3	Kuroonj	96	448	544	6	550	188	476	664
4	Katurkurak	137	375	512	27	539	141	380	521
5	Ardow	21	113	134	7	141	34	119	153
6	Bhowoor	246	331	577	5	582	305	370	675
7	Sudolee	162	111	273	6	279	204	129	333
8	Yelsey	167	104	271	7	278	247	118	365
9	Kaleh	41	243	284	27	311	41	242	283
10	Poosehneh	232	282	514	86	600	331	308	639
11	Shewunttee	20	67	87	4	91	24	73	97
12	Budowlee	80	93	173	3	176	95	106	201
13	Bhailuj	118	9	127	32	159	132	11	143
14	Wuluk	92	136	228	2	230	171	154	325
	Caried over..	1,536	2,779	4,315	224	4,539	2,106	3,002	5,108

DIVISION.

proposed Rates for the Villages of Class 2nd.

year's Cultivation, 1262.			Details of New Measurement and Assessment.						Estimated Revenue from Kooruns, Grazing Lands, and Dulce Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jerayet.		Rice.		Total.			
Jerayet.	Rice.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
82	200	282	320	104	92	201	412	305	6	311
88	110	204	291	129	56	124	347	253	5	258
162	324	486	588	238	144	332	732	570	7	577
30	404	434	321	96	158	405	479	501	74	575
26	88	114	120	44	42	92	162	136	12	148
338	336	674	862	453	135	340	997	793	..	793
158	112	270	350	181	45	113	395	294	20	314
213	112	325	308	250	60	116	374	366	7	373
51	172	223	208	105	78	176	286	281	21	302
356	276	632	1,001	420	126	284	1,187	707	119	826
11	60	71	42	19	29	61	71	80	4	84
73	73	146	224	121	43	80	267	201	5	206
137	17	154	1,073	503	10	20	1,083	523	19	542
135	98	233	243	183	50	112	293	295	1	295
1,860	2,388	4,248	5,951	2,849	1,074	2,156	7,085	5,305	299	5,604

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jerayet.	Rice.	Total.	From Korum, Grazing Lands, and Duljee Cult- vation.	Total.	By present Rates.		
							Jerayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	Brought over..	1,536	2,779	4,315	224	4,539	2,106	3,002	5,108
15	Takweh Khoord ..	120	193	313	15	328	157	205	362
16	Moondarweh	94	65	159	3	162	186	72	258
17	Wawoond.....	24	360	384	16	400	42	408	450
18	Ghonshet	73	139	212	6	218	69	184	253
19	Fhulneh	116	109	225	3	228	178	130	308
20	Rajpooree.....	140	20	160	28	188	186	25	211
21	Sheerowteh	57	265	322	31	353	77	284	361
22	Nanseh.....	504	220	724	22	746	920	272	1,192
23	Wadewulce	128	17	145	3	148	236	21	257
24	Pharwudee	50	25	75	10	85	59	21	80
25	Khamshet.....	62	124	186	15	201	108	148	256
26	Nanolee	32	54	86	10	96	51	56	107
27	Shyee	60	208	268	29	297	93	246	339
28	Cheekulseh	103	245	348	12	360	153	287	440
29	Jambhool	176	58	234	22	256	276	67	343
	Carried over..	3,275	4,881	8,156	449	8,605	4,897	5,428	10,325

year's Cultivation, 1993.			Details of New Measurement and Assessment.						Estimated Revenue from Kooruns, Grazing Lands, and Dulles Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jerayet.		Rice.		Total.			
Jerayet.	Rice.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
1,860	2,388	4,248	5,951	2,849	1,074	2,456	7,085	5,305	299	5,604
95	210	305	426	223	97	220	523	443	45	488
227	56	283	666	378	31	66	697	444	..	444
8	350	358	97	37	201	380	298	417	70	487
56	241	297	405	196	174	279	579	475	2	477
77	77	154	711	194	41	87	752	281	9	290
121	31	152	667	236	14	33	681	269	44	313
22	266	288	262	114	109	304	371	418	33	451
936	248	1,184	1,814	1,437	121	251	1,935	1,688	48	1,736
202	14	216	296	286	8	15	304	301	4	305
60	21	81	473	195	33	56	506	251	..	251
84	115	199	158	107	50	122	208	229	31	260
26	38	64	319	139	35	52	354	191	..	191
66	213	279	330	153	143	241	473	394	43	437
140	182	322	780	353	98	210	878	563	7	570
151	84	235	1,456	643	47	91	1,503	734	46	770
4,131	4,534	8,665	14,811	7,540	2,276	4,863	17,147	12,403	681	13,074

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jerayet.	Rice.	Total.	From Kooruns, Graning Lands, and Dullee Cult- vation.	Total.	By present Rates.		
							Jerayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	Brought over..	3,275	4,881	8,156	449	8,605	4,897	5,428	10,325
30	Wurgauam.....	476	100	576	83	659	616	113	731
31	Khaneh.....	227	114	341	15	356	333	156	489
32	Sangwee	168	8	176	6	182	310	11	321
33	Khurkala	74	139	213	9	222	125	150	275
34	Pathurgaum.....	79	113	192	4	196	125	124	249
35	Satheh	573	253	826	14	840	817	293	1,110
36	Bhoruj	190	70	260	8	268	349	75	424
37	Koosgaon Khoord.	39	122	161	20	181	68	144	212
38	Carlee	312	216	528	7	535	489	247	736
39	Sadapoor	56	76	132	5	137	70	91	161
40	Duheeweylee	55	49	104	27	131	85	58	143
41	Naeegaum.....	186	74	260	19	279	379	94	473
42	Aheerwadee	106	76	182	3	185	163	88	251
43	Thaahzeh	197	238	435	35	470	276	272	548
44	Wulwun	106	224	330	11	341	133	213	346
	Carried over..	6,119	6,753	12,872	715	13,587	9,237	7,557	16,794

year's Cultivation, 1902.			Details of New Measurement and Assessment.						Estimated Revenue from Kooruns, Grazing Lands, and Dullees Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jeravet.		Rice.		Total.			
Jeravet.	Rice.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
4,131	4,534	8,665	14,811	7,540	2,276	4,863	17,147	12,403	681	13,074
667	217	884	1,827	869	93	220	1,920	1,089	194	1,283
318	133	451	1,323	686	72	140	1,395	826	12	838
223	14	237	763	399	8	17	771	416	17	433
136	133	269	694	514	62	134	756	648	17	665
89	94	183	118	100	45	101	163	201	8	209
752	325	1,077	1,523	964	148	332	1,671	1,296	9	1,305
269	73	342	316	309	39	83	355	392	7	399
10	140	150	278	123	67	143	345	266	36	302
424	280	704	838	743	106	283	944	1,026	8	1,034
95	101	196	314	183	38	115	352	298	15	313
43	98	141	372	146	47	119	419	265	38	303
511	94	605	994	625	48	95	1,042	720	6	726
175	66	241	478	238	31	67	509	305	5	310
212	315	527	535	329	153	325	678	654	64	718
91	248	339	237	173	184	440	421	613	5	618
8,146	6,865	15,011	25,471	13,941	3,417	7,477	28,888	21,418	1,122	22,540

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jaryet.	Rice.	Total.	From Kooruns, Grazing Lands, and Bullee Culti- vation.	Total.	By present Rates.		
							Jaryet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	Brought over..	6,119	6,753	12,872	715	13,587	9,237	7,557	16,794
45	Awundolee	38	173	211	28	239	68	179	237
46	Pimpulwole	30	314	344	29	373	40	326	366
47	Pattun	101	308	409	35	444	192	328	520
48	Malowlee	68	10	78	5	83	174	25	199
49	Shelatneh	180	310	490	20	510	321	309	630
50	Wairgaum	113	314	427	12	439	177	342	519
51	Sanhees	72	324	396	12	408	101	377	478
	Grand Total..	6,721	8,506	15,227	866	16,083	10,300	9,443	19,743

year's Cultivation, 1902.			Details of New Measurement and Assessment.							Estimated Revenue from Kooruna, Grazing Lands, and Dullee Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jerayet.		Rice.		Total.				
Jerayet.	Rice.	Total.	Acres.	Assesment.	Acres.	Assesment.	Acres.	Assesment.			
11	12	13	14	15	16	17	18	19	20	21	
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.	
8,146	6,865	15,011	25,471	13,941	3,417	7,477	28,888	21,418	1,122	22,540	
27	157	184	199	57	57	167	256	224	54	278	
21	300	321	260	75	113	320	373	395	36	431	
106	297	403	189	125	138	304	327	429	50	479	
132	52	184	202	199	32	59	234	258	5	263	
287	234	521	481	338	137	283	618	621	33	654	
85	367	452	184	117	164	381	348	498	3	501	
93	227	320	312	147	105	241	417	388	9	397	
8,897	8,499	17,396	27,298	14,999	4,163	9,232	31,461	24,231	1,312	25,543	

J. FRANCIS, Captain,
Superintendent of Poona and Tanna Revenue Survey.

MAMLUTDAR'S

STATEMENT *contrasting present and*

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jerayet.	Rice.	Total.	From Koorung, Grazing Lands, and Dullee Cultiva- tion.	Total.	By present Rates.		
							Jerayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Khurdeh	134	396	530	11	541	169	410	579
2	Shivelee	81	274	355	8	363	94	282	376
3	Shudgaum	8	152	160	9	169	8	155	163
4	Palley	39	211	250	11	261	8	292	300
5	Ambèhgaum	23	397	420	7	427	38	406	444
6	Mahagaum	51	622	673	54	727	54	637	691
7	Takweh Boodrook.	231	122	353	28	381	375	139	514
8	Wadewalee	44	69	113	4	117	60	77	137
9	Wuluntèe	33	58	91	12	103	57	69	126
10	Somawadee	19	30	49	9	58	44	45	89
11	Neegra	232	300	532	46	578	250	244	494
12	Naisaweh	36	335	371	60	431	40	377	417
13	Jhawureh	8	104	112	19	131	15	108	123
14	Dalawadee	17	62	79	26	105	18	68	86
	Caried over..	956	3,132	4,088	304	4,392	1,230	3,309	4,539

DIVISION.

proposed Rates for the Villages of Class 3rd.

year's Cultivation, 1202.			Details of New Measurement and Assessment.						Estimated Revenue from Kooruns, Grazing Lands, and Dullees Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jerayet.		Rice.		Total.			
Jerayet.	Rice.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
182	328	510	703	301	154	344	857	645	30	675
85	301	386	422	140	127	304	549	444	12	456
6	132	138	31	11	44	136	75	147	14	161
2	160	162	191	43	69	172	260	215	12	227
11	340	351	96	23	138	348	234	371	13	384
57	576	633	507	114	253	580	760	694	22	716
626	133	759	2,270	1,102	112	157	2,382	1,259	27	1,286
52	77	129	401	156	27	84	428	240	1	241
49	77	126	229	81	30	78	259	159	21	180
42	28	70	300	86	14	35	314	121	12	133
626	171	797	2,698	1,013	103	216	2,801	1,229	63	1,292
94	168	262	404	139	85	175	489	314	56	370
11	171	182	141	33	107	237	248	270	19	289
5	94	99	59	12	33	94	92	106	41	147
1,848	2,756	4,604	8,452	3,254	1,296	2,960	9,748	6,214	343	6,557

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jerayet.	Rice.	Total.	From Koorus, Grazing Lands, and Dulce Cultivation.	Total.	By present Rates.		
							Jerayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	Brought over..	956	3,132	4,088	304	4,392	1,230	3,309	4,539
15	Doodvere	15	69	84	32	116	17	74	91
16	Ooda Khoord	89	292	381	50	431	96	315	411
17	Dongurgaum	80	49	129	8	137	96	62	158
18	Lohowadee	20	16	36	46	82	11	23	34
19	Dehwul.....	125	304	429	46	475	183	379	562
20	Deoghur	110	106	216	3	219	142	145	287
21	Toongurlee	47	90	137	27	164	65	121	186
22	Lonowleh	60	182	242	53	295	158	213	371
23	Wursolee	52	132	184	8	192	54	98	152
24	Koosgaum Bood- rook	74	131	205	26	231	138	136	274
25	Bhoosee	15	93	108	27	135	23	135	158
26	Kundala	55	129	184	50	234	72	141	213
	Grand Total..	1,698	4,725	6,423	680	7,103	2,285	5,051	7,336

year's Cultivation,
1263.

Details of New Measurement and Assessment.

By proposed Rates.			Jerayet.		Rice.		Total.		Estimated Revenue from Koorun, Grazing Lands, and Dullee Cultivation.	Grand Total of New Assessment
Jerayet.	Rice.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
1,848	2,756	4,604	8,452	3,254	1,296	2,960	9,748	6,214	343	6,557
7	66	73	147	27	26	69	173	96	33	129
41	343	384	398	111	133	350	531	461	90	551
64	84	148	395	209	57	115	452	324	7	331
5	21	26	104	24	11	28	115	52	64	116
225	434	659	469	315	171	444	640	759	70	829
99	126	225	217	150	54	127	271	277	2	279
49	178	227	561	119	83	216	644	335	62	397
34	318	352	763	253	151	416	914	669	40	709
61	122	183	271	128	109	293	380	421	23	444
9	206	215	366	115	108	293	474	408	37	445
17	185	202	423	132	131	279	554	411	15	426
22	140	162	360	72	45	143	405	215	53	268
2,481	4,979	7,460	12,926	4,909	2,375	5,733	15,301	10,642	839	11,481

J. FRANCIS, Captain,
Superintendent of Poona and Tanna Revenue Survey.

MAMLUUDAR'S

STATEMENT *contrasting present and*

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jerayet.	Rice.	Total.	From Kooruns, Grazing Lands, and Dullee Culti- vation.	Total.	By present Rates.		
							Jerayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Gaiwundeh	32	146	178	50	228	44	159	203
2	Aptee	40	203	243	52	295	29	210	239
3	Hutwun .....	..	..	..	45	45	..	..	..
4	Jamboleeh	10	76	86	22	108	26	85	111
5	Oombreh	49	93	142	23	165	58	113	171
6	Thorneh	63	243	306	38	344	76	273	349
7	Oundeh Boodrook.	130	320	450	53	503	108	357	465
8	Wulwund	63	129	192	55	247	95	146	241
9	Oondehwadee	25	2	27	56	83	27	3	30
10	Sheerdeh	45	29	74	20	94	71	48	119
11	Rakswadee	10	14	24	16	40	14	13	27
12	Thoraney	45	65	110	27	137	57	77	134
13	Oarpeh	20	88	108	15	123	1	99	100
14	Kooneh	50	119	169	27	196	41	129	170
15	Koorwund	65	319	384	113	497	98	403	501
16	Malwade .....	..	2	2	79	81	..	1	1
	Grand Total..	647	1,848	2,495	691	3,186	745	2,116	2,861

DIVISION.

proposed Rates for the Villages of Class 4th.

year's Cultivation, - 1202.			Details of New Measurement and Assessment.						Estimated Revenue from Koorun, Grazing Lands, and Dallee Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jerayet.		Rice.		Total.			
Jerayet.	Rice.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
25	165	190	466	75	76	174	542	249	57	306
36	285	321	469	73	123	286	592	359	68	427
3	57	60	32	5	28	58	60	63	56	119
7	90	97	166	28	38	93	204	121	19	140
36	129	165	399	97	62	135	461	232	28	260
13	372	385	283	53	147	405	430	458	39	497
11	546	557	426	132	242	642	668	774	62	836
..	171	171	16	2	84	207	100	209	75	284
..	6	6	..	..	4	9	4	9	45	54
50	54	104	649	124	26	55	675	179	23	202
1	12	13	440	73	12	18	452	91	2	93
18	69	87	596	114	34	70	630	184	28	212
..	93	93	135	48	37	99	172	147	12	159
24	102	126	395	71	47	108	442	179	38	217
30	465	495	1,400	307	212	543	1,612	850	116	966
2	9	11	87	18	6	10	93	28	98	126
256	2,625	2,881	5,959	1,220	1,178	2,912	7,137	4,132	766	4,898

J. FRANCIS, Captain,
Superintendent of Poona and Tanna Revenue Survey.

MAHALKURRY'S

STATEMENT contrasting present and

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jerayet.	Rice.	Total.	From Kooruns, Graving Land, and Dullee Cultu- vation.	Total.	By present Rates.		
							Jerayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs. •	Rs.	Rs.
1	Powur	157	553	710	54	764	203	602	805
2	Amburwait	287	460	747	66	813	332	505	837
3	Darolee.....	430	581	1,011	139	1,150	615	627	1,242
4	Kondowlai	307	584	891	9	900	358	620	978
	Grand Total..	1,181	2,178	3,359	268	3,627	1,508	2,354	3,862

DIVISION.

proposed Rates for the Villages of Class 1st.

year's Cultivation, 1262.			Details of New Measurement and Assessment.						Estimated Revenue from Kooruns, Grazing Lands, and Dullee Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jerayet.		Rice.		Total.			
Jerayet.	Rice.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
234	485	719	660	398	181	500	841	898	54	952
327	455	782	1,501	516	174	470	1,675	986	66	1,052
195	590	785	1,107	486	214	645	1,321	1,131	139	1,270
357	500	857	678	448	186	515	864	963	9	972
1,113	2,030	3,143	3,946	1,848	755	2,130	4,701	3,978	268	4,246

J. FRANCIS, Captain,
Superintendent of Poona and Tanna Revenue Survey.

MAHALKURRY'S

STATEMENT contrasting present and

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jerayet.	Rice.	Total.	From Kooruns, Grazing Lands, and Dullee Culti- vation.	Total.	By present Rates.		
							Jerayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Sumbuwch	73	311	384	13	397	84	323	407
2	Sheelshwur	30	163	193	4	197	31	199	170
3	Asday	97	375	472	4	476	91	381	472
4	Koobowlee	41	298	339	9	348	41	301	342
5	Rawray	102	365	467	33	500	122	404	526
6	Chinchwur	37	374	411	7	418	45	416	461
7	Bailowreh	94	406	500	43	543	133	445	578
8	Kaichurch..	139	749	888	79	967	185	774	959
9	Andaiseh	87	465	552	6	558	87	484	571
10	Mandaira	119	419	538	59	597	202	435	637
11	Kullumshait	74	111	185	46	231	78	119	197
12	Shaireh	145	423	568	29	597	182	458	640
13	Akoleh	164	237	401	3	404	175	263	438
	Grand Total..	1,202	4,696	5,898	335	6,233	1,456	4,942	6,398

DIVISION.

proposed Rates for the Villages of Class 2nd.

year's Cultivation, 1802.			Details of New Measurement and Assessment.						Estimated Revenue from Kooruns, Grazing Lands, and Dullees Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jerayet.		Rice.		Total.			
Jerayet.	Rice.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
69	297	366	235	89	85	301	320	390	13	403
22	112	134	132	40	67	171	199	211	4	215
65	319	384	173	84	121	322	294	406	4	410
25	234	257	188	70	91	238	279	308	9	317
99	270	369	255	142	136	274	391	416	33	449
40	310	350	308	80	114	319	422	399	7	406
81	387	468	455	173	139	396	594	569	43	612
78	652	730	494	165	224	661	718	826	79	905
125	526	651	450	197	179	540	629	737	6	743
55	544	599	401	104	181	549	582	653	59	712
76	108	184	157	110	43	112	200	222	46	268
103	571	674	712	253	186	594	898	847	29	876
208	207	415	326	228	129	210	455	438	3	441
1,044	4,537	5,581	4,286	1,735	1,695	4,687	5,981	6,422	335	6,757

J. FRANCIS, Captain,
Superintendent of Poona and Tanna Revenue Survey.

MAHALKURRY'S

STATEMENT contrasting present and

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jerayet.	Rice.	Total.	From Kooruns, Grazing Lands, and Dallee Cultivation.	Total.	By present Rates.		
							Jerayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Chandeewlee	28	283	311	27	338	55	291	346
2	Wurwathur	33	250	283	22	305	37	235	272
3	Nandeewlee	80	394	474	18	492	103	438	541
4	Naneewlee	14	193	207	9	216	22	252	274
5	Wulneh	121	433	554	32	586	143	457	600
6	Dongurgaum	77	532	609	19	628	68	527	595
7	Sherowlee	61	524	585	55	640	96	546	642
8	Jambgaum	26	280	306	20	326	39	290	329
9	Dislee	27	67	94	2	96	39	65	104
10	Maleh	170	540	710	105	815	219	581	800
11	Pureetwaree	17	45	62	3	65	20	47	67
12	Moolsee Khoord ..	28	113	141	16	157	46	129	175
13	Moolsee Boodrook.	55	402	457	27	484	69	428	497
14	Gonawree	24	273	297	37	334	30	282	312
15	Pulsay	13	203	216	19	235	17	204	221
16	Waruk	20	285	305	48	353	21	309	330
17	Wurgaum	16	187	203	18	221	23	206	229
	Carried over..	810	5,004	5,814	477	6,291	1,047	5,287	6,334

DIVISION.

proposed Rates for the Villages of Class 3rd.

year's Cultivation, 1202.			Details of New Measurement and Assessment.						Estimated Revenue from Kooruns, Grazing Lands, and Dullee Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jerayet.		Rice.		Total.			
Jerayet.	Ricc.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21.
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
4	216	220	103	21	72	217	175	238	27	265
12	276	288	184	47	102	316	286	363	22	385
65	432	497	131	77	130	445	261	522	18	540
10	220	230	60	19	71	234	131	253	9	262
49	540	589	131	59	175	548	306	607	32	639
20	427	447	128	29	137	468	265	497	19	516
21	450	471	198	47	140	459	338	506	55	561
22	306	328	69	37	98	315	167	352	20	372
14	81	95	45	19	28	82	73	101	2	103
150	837	987	336	174	246	864	582	1,038	105	1,143
7	76	83	41	26	23	81	64	107	3	110
5	175	180	47	15	53	189	100	204	16	220
27	432	459	59	46	120	441	179	487	27	514
..	297	297	55	12	94	382	149	394	37	431
..	207	207	19	6	62	238	81	244	19	263
4	270	274	62	32	100	378	162	410	48	458
..	175	175	40	11	63	216	103	227	18	245
410	5,417	5,827	1,708	677	1,714	5,873	3,422	6,550	477	7,027

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jerayet.	Rice.	Total.	From Kooruna, Grazing Lands, and Dullee Cult- ivation.	Total.	By present Rates.		
							Jerayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	Brought over..	810	5,004	5,814	477	6,291	1,047	5,287	6,334
18	Seergaum	7	216	223	16	239	12	212	224
19	Bhadus Khoord ..	12	153	165	28	193	36	167	203
20	Nimburwaree	12	70	82	3	85	19	78	97
21	Wudoosteh	53	365	418	22	440	70	352	422
22	Bhorkus	32	407	439	20	459	37	449	486
23	Aiheerwaree	6	76	82	7	89	12	87	95
24	Dangoleh	1	33	34	2	36	..	30	30
25	New Khundeh	33	139	172	13	185	43	154	197
26	Aksai	17	71	88	7	95	16	79	95
27	Deewulolee	11	272	283	13	296	16	289	305
28	Awalus	18	353	371	44	415	39	398	437
29	Vailowlee	8	68	76	5	81	20	78	98
	Grand Total..	1,020	7,227	8,247	657	8,904	1,367	7,660	9,027

year's Cultivation, 1262.			Details of New Measurement and Assessment.						Estimated Revenue from Kooruns, Grazing Lands, and Dullee Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jerayet.		Rice.		Total.			
Jerayet.	Rice.	Total.	Acrea.	Assessment.	Acrea.	Assessment.	Actes.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
410	5,417	5,827	1,708	677	1,714	5,873	3,422	6,550	477	7,027
1	166	167	36	19	98	351	134	370	16	386
1	192	193	24	6	56	192	80	198	28	226
11	132	143	54	21	47	133	101	154	3	157
19	400	419	115	56	133	423	248	479	22	501
11	436	447	186	56	142	463	328	519	20	539
1	112	113	84	20	41	120	125	140	17	157
..	..	..	..	..	16	56	16	56	2	58
24	180	204	249	71	61	180	310	251	13	264
5	76	81	93	35	21	78	114	113	7	120
11	256	267	152	35	72	261	224	296	13	309
39	584	623	715	171	210	596	925	767	44	811
5	76	81	90	20	27	78	117	98	5	103
538	8,027	8,565	3,506	1,187	2,638	8,804	6,144	9,991	667	10,658

J. FRANCIS, Captain,
Superintendent of Poona and Tanna Revenue Survey.

MAHALKURRY'S

STATEMENT contrasting present and

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fuslee		
		Jera- yet.	Rice.	Total.	From Koorung, Grazing Lands, and Dullee Cult- ivation.	Total.	By present Rates.		
							Jera- yet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Dawree.....	1	18	19	1	20	....	25	25
2	Chacheewlee	5	221	226	20	246	7	291	298
3	Tamuneh Boodrook	34	124	158	88	246	44	142	186
4	Saroleh.....	5	134	139	9	148	14	173	187
5	Neweh	12	317	329	50	379	24	367	391
6	Moree	5	204	209	13	222	9	285	294
7	Wandreh	8	94	102	17	119	19	112	131
8	Pimpree	13	92	105	70	175	31	123	154
9	Tamuneh Khoord.	4	66	70	8	78	4	87	91
10	Barpeh Boodrook.	18	93	111	18	129	41	104	145
11	Yehkoleh	8	35	43	20	63	23	50	73
12	Moolapoor.	16	123	139	18	157	39	162	201
13	Veesakur	34	62	96	43	139	71	73	144
14	Gootkeh	7	55	62	27	89	17	68	85
15	Ambowneh	33	111	144	64	208	56	134	190
16	Teeskurree	9	25	34	19	53	32	39	71
17	Maloosteh	6	18	24	18	42	22	37	59
	Carried over..	218	1,792	2,010	503	2,513	453	2,272	2,725

DIVISION.

proposed Rates for the Villages of Class 4th.

year's Cultivation, 1902.			Details of New Measurement and Assessment.						Estimated Revenue from Kooruns, Grazing Lands, and Dullee Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jernyet.		Rice.		Total.			
Jernyet.	Rice.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		Rs.		Rs.	Rs.	Rs.
..	7	7	6	2	10	24	16	26	1	27
..	204	204	33	11	78	244	111	255	20	275
1	126	127	122	26	74	171	196	197	88	285
1	168	169	20	6	73	189	93	195	9	204
..	276	276	95	16	130	392	225	408	50	458
..	136	136	95	26	120	352	215	378	13	391
1	96	97	38	5	38	132	76	137	17	154
13	168	181	206	36	86	178	292	214	70	284
..	84	84	29	5	33	81	62	89	8	97
27	164	191	710	142	70	171	780	313	18	331
13	59	72	254	45	32	60	286	105	20	125
13	147	160	355	74	64	154	419	228	18	246
33	52	85	451	64	31	56	482	120	43	163
22	70	92	518	78	42	87	560	165	27	192
22	178	200	1,517	250	74	199	1,591	449	64	513
8	38	46	492	74	24	49	516	123	19	142
12	35	47	378	70	13	35	391	105	18	123
166	2,008	2,174	5,319	930	992	2,577	6,311	3,507	503	4,010

Number.	NAMES OF VILLAGES.	Yearly Revenue under present Rates deduced from an average of 23 years.					Assessment on last Fiscal		
		Jarayet.	Rice.	Total.	From Kooruna, Grazing Lands, and Dulles Cult- ivation.	Total.	By present Rates.		
							Jarayet.	Rice.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	Brought over..	218	1,792	2,010	503	2,513	453	2,272	2,725
18	Bamburdeh	17	172	189	38	227	35	225	260
19	Teesteh	5	42	47	4	51	17	42	59
20	Saltur..	17	88	105	25	130	33	114	147
21	Koombairee	35	70	105	34	139	93	106	199
22	Kolowlee	41	47	88	21	109	44	56	100
23	Dewghur	15	61	76	55	131	69	79	148
24	Masgaum	11	40	51	20	71	39	79	118
25	Shapoor.....	14	24	38	17	55	62	38	100
26	Tailbyla	16	88	104	34	138	26	122	148
27	Argaum.....	5	31	36	20	56	11	57	68
28	Nandgaum	4	18	22	18	40	35	30	65
29	Kotairee	3	6	9	8	17	20	23	43
30	Jambolneh	3	1	4	14	18	68	6	74
31	Barpeh Khoord ..	9	72	81	11	92	22	98	120
32	Pomgaum.....	60	196	256	77	333	116	224	340
	Grand Total ..	473	2,748	3,221	899	4,120	1,143	3,571	4,714

year's Cultivation, 1902.			Details of New Measurement and Assessment.						Estimated Revenue from Koorung, Grazing Lands, and Dulles Cultivation.	Grand Total of New Assessment.
By proposed Rates.			Jerayet.		Rice.		Total.			
Jerayet.	Rice.	Total.	Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
11	12	13	14	15	16	17	18	19	20	21
Rs.	Rs.	Rs.		Rs.		R s		Rs.	Rs.	Rs.
166	2,008	2,174	5,319	930	992	2,577	6,311	3,507	503	4,010
7	224	231	317	55	106	234	423	289	38	327
2	38	40	69	13	17	42	86	55	4	59
22	112	134	697	130	53	129	750	259	25	284
57	98	155	721	130	35	101	756	231	34	265
20	56	76	347	69	24	58	371	127	21	148
48	73	121	494	107	32	77	5 ²⁶	184	55	239
26	63	89	667	122	26	67	693	189	20	209
32	49	81	384	58	22	63	406	121	17	138
19	108	127	575	98	48	119	623	217	34	251
4	56	60	202	30	41	67	243	97	20	117
14	28	42	161	26	11	29	172	55	18	73
25	21	46	138	28	9	22	147	50	8	58
9	3	12	79	15	3	7	82	22	14	36
1	98	99	70	11	40	99	110	110	11	121
17	241	258	596	105	93	259	689	364	77	441
469	3,276	3,745	10,836	1,927	1,552	3,950	12,388	5,877	899	6,776

J. FRANCIS, Captain,
Superintendent of Poona and Tanna Revenue Survey.

No. 298 OF 1854.

From E. C. JONES, Esq.,
Collector of Poona,

To H. W. REEVES, Esq.,
Acting Revenue Commissioner, S. D.

SIR,—I beg to hand up for the approval of Government a report (No. 33, dated 31st January 1854) from Captain Francis, Superintendent of the Deccan Survey, giving details of the proposed new assessment for the district of Mawul in this collectorate.

2. After giving a correct description of the natural aspect of the district, as well as its position, soil, and products, Captain Francis in his 8th paragraph commences with his report on the measurement, of which he gives a very satisfactory account.

3. The classification of the jerayet lands as well as the measurement are technical matters, concerning which my opinion is unnecessary further than to state that I believe that there is little to fear for the accuracy of these operations when left to the experienced hands of Mr. Hexten and Captain Francis.

4. The classification on the rice-land was fixed on the same principle as that adopted elsewhere: it is ostensibly dependent on the description of rice the land is capable of producing; but since the land is cultivated with superior sorts of rice in proportion to its peculiar fitness, it follows that the value of the grain produced is the best criterion of its capability to bear a high or low assessment.

5. Captain Francis in his 11th and following paragraphs describes his division of the villages into four groups or classes, and the reasons assigned for determining to which class each village should belong. I think are judicious. The arrangement, like that which was adopted in the Kheir and Jooneer mawuls, is founded upon the well-ascertained local peculiarities of climate and position.

18. Dullee cultivation is the next subject to which Captain Wingate draws attention, and my plan of assessing these lands does not meet his approval. As before mentioned in original report, I have had so little opportunity of forming an opinion on this question that I am not prepared to add any further argument in support of the plan recommended. I think therefore it would be advisable to take advantage of Captain Wingate's advice, viz. to continue the uniform rate of 12 annas on the "kohita" for the present. I would beg respectfully to suggest that the opinion of Dr. Gibson be solicited on the subject of dullee cultivation, chiefly to ascertain whether it would be injurious to the forests in the ghauts to hold out inducement to the extension of this cultivation by a reduction in the present rate of assessment on the "kohita."

Paragraph 26. 19. I have now to thank Captain Wingate for kindly explaining how the great increase in the assessment of the rice-lands of the Brahmunwaree villages, as shown in Appendix G, is to be accounted for. As he supposes, this was my only reason for proposing such low rates, and I beg therefore that as it appears that my calculations were not correct, the rate of Rs. 3 may be substituted for Rs. 2. The following will be the result from this change in the rate:—

The new kumal on rice and jerayet	Rs. 1,836
Estimated revenue from dullee and grazing lands	158
<hr/>	
Total	Rs. 1,994

Carrying on the form of comparison in paragraph 53, we have the following sums:—

Last year's revenue from rice and jerayet	Rs. 1,656
Estimated revenue at first jumabundy	1,026
<hr/>	
Difference	Rs. 630

If we also make allowance for the increase in cultivation for the reasons given in paragraph 53, we may estimate the first year's revenue to be upwards of Rs. 1,100, thus making the reduction about 33 or 34 per cent. instead of 40.

20. From the foregoing observations it will thus be apparent that I have adopted all the modifications recommended by Captain Wingate, excepting that of the addition of four classes of villages, and I have only to request that in deciding on this point my remarks may have some little consideration as being the result of an attentive study and observation of the peculiar features of the district. In conclusion I would earnestly beg that the introduction of the rates may be sanctioned either with or without the above-mentioned slight modification, for the Jooneer ryots have already been once disappointed in the anticipated introduction of the new assessment, and a second disappointment would shake all confidence in the benefit of the survey operations, not only for their case, but throughout the collectorate generally.

STATEMENT

OF THE

**CULTIVATION, ASSESSMENT, REMISSIONS, AND COL-
LECTIONS IN THE MAMLUTDAR'S DIVISION OF
THE JOONEER TALOOKA.**

STATEMENT of the Cultivation, Assessment, Remissions, and Collections in the Mamlatdar's Division of the Jounser Talooka for the within mentioned years.

Years	Fuslee Cultivated Khales Beegs.	Assessment.		Average Rate.		Remissions.		Realisations.		Average Rate realised.	
		Ra.	a. p.	Ra.	a. p.	Ra.	a. p.	Ra.	a. p.	Ra.	a. p.
1230	77,459½ 1 4	83,673	15 8	1 1 3		.....		83,673	15 8	1 1 3	
1231	77,185½ 4 3½	83,181	13 1	1 1 2		821 1 4		82,360	11 9	1 1 0	
1232	72,862½ 2½ 1½	79,773	4 7	1 1 6		2,580 11 9		77,192	8 10	1 0 11	
1233	69,388½ 4½ 1½	77,048	2 7	1 1 9		31,660 3 10		45,387	14 9	0 10 5	
1234	64,663 1½ 0½	72,073	4 1	1 1 10		28,974 9 5		43,098	10 8	0 10 7	
1235	71,370½ 1½ 3½	75,264	3 4	1 0 10		2,099 1 11		73,165	1 5	1 0 4	
1236	71,302½ 1 3½	76,438	5 10	1 1 1		20,723 1 0		55,715	4 10	0 12 6	
1237	65,323½ 3 1	72,226	4 1	1 1 8		16,818 3 7		55,408	0 6	0 13 6	
1238	62,890½ 1 3½	69,943	0 1	1 1 9		11,502 11 8		58,440	4 5	0 14 10	
	632,447½ 0½ 1½	6,89,622	5 4	.....		1,15,179 12 6		5,74,442	8 10	.....
	70,271½ 3½ 0	76,624	11 3	1 1 5		12,797 12 0		63,826	15 2	0 14 6	

1239	46,386	30	61	55,548	10 11	1 3 1	30,478	12 6	25,069	14 5	0 8 7
1240	44,631	37	9	55,802	12 8	1 4 0	10,441	13 5	45,360	15 3	1 0 3
1241	46,210	0	12	54,217	6 2	1 2 9	13,191	0 2	41,026	6 0	0 14 2
1242	51,457	27	15	56,997	0 2	1 1 8	16,194	10 3	40,802	5 11	0 12 8
1243	53,405	21	0	59,073	4 7	1 1 8	393	1 4	58,680	3 3	1 1 5
1244	52,420	10	5	60,001	15 4	1 2 3	48	2 9	59,953	12 7	1 2 3
1245	52,697	38	2	39,100	12 1	1 1 11	844	0 10	58,256	11 3	1 1 8
1246	52,682	12	5	58,993	5 6	1 1 10	18,875	10 0	40,117	11 6	0 12 2
1247	55,831	13	8	61,534	2 3	1 1 7	2,080	14 2	59,453	4 1	1 1 0
1248	58,250	34	5	61,143	10 4	1 0 9	26,158	8 5	34,985	1 11	0 9 7
1249	51,787	21	13	63,213	11 1	1 3 6	15,214	10 0	47,999	1 1	0 14 9
1250	54,293	10	6	62,151	10 6	1 2 3	4,699	15 3	57,451	11 3	1 0 11
1251	56,052	18	0	62,580	15 2	1 1 10	12,672	6 0	49,908	9 2	0 14 2
1252	57,151	13	9	64,730	13 7	1 2 1	1,523	13 8	63,206	15 11	1 1 8
1253	57,437	11	2	63,778	3 7	1 1 9	7,720	1 3	56,058	2 4	0 15 7
1254	54,287	27	4	60,765	0 3	1 1 10	13,173	0 7	47,591	15 8	0 14 0
8,44,992				8	0	.....	2,88,890	5 1	7,85,922	13 7	.....
52,812				0	0	1 2 2	18,055	10 3	49,120	2 10	0 14 10

STATEMENT of the Cultivation and Assessment in the 36 Villages under report for the year 1255 Fuzlee.

TOTAL ACRES	Unculturable	Culturable	Deduct Kham.	Remaining	Deduct Waste	Remaining Cultivated	Assessment or Cultivated Land.	Baptee.	Surplus.	Remissions	Remaining.
44,752 15 4	8,144 6 1	36,609 35 8	4,438 33 2	32,171 2 6	7,089 9 2	25,087 33 4	32,373 5 2	986 7 1	85,369 13 1	2,981 12 1	30,388 1 0

STATEMENT

OF THE

**ASSESSMENT THAT WILL BE PRODUCED IN THE
36 VILLAGES UNDER REPORT BY THE
PROPOSED RATES.**

STATEMENT of the Assessment that will be produced

		Proposed Rates.	Acres.	Assessment.	DE-	
					Waste.	
					Acres.	Assessment.
		Rs.		Rs. a. p.		Rs. a. p.
Guddes	{ 1st	1,200	7 38	23 13 7	....	....
	{ 2nd	900	70 18	158 8 2	4 31	10 11 11
	{ 3rd	600	90 6	135 3 7	9 16	14 1 7
Dhalee.....	{ 1st	650	20 12	32 15 9	....	....
	{ 2nd	625	17 1	26 9 8	....	....
Kheotah	1st	600	....	....	..	....
Black	{ 1st	600	5,478 20	8,217 12 0	191 39	287 15 5
	{ 2nd	475	4,128 19	4,902 9 0	271 8	322 0 9
	{ 3rd	350	3,936 22	3,444 7 8	364 29	319 2 2
Red.....	{ 1st	525	3,896 11	5,113 13 9	308 39	405 8 6
	{ 2nd	375	4,644 29	4,354 6 10	583 1	546 9 4
	{ 3rd	237	5,925 38	3,511 2 0	1,094 20	648 7 10
Bardes	{ 1st	275	5,687 22	3,910 3 0	896 6	616 1 8
	{ 2nd	150	6,168 33	2,343 4 11	1,857 19	696 8 10
	{ 3rd	75	4,979 9	933 9 8	1,851 22	347 2 8
Dongun	{ 1st	150	1,253 38	470 3 9	1,197 28	449 2 2
	{ 2nd	100	2,221 10	555 5 0	2,050 34	512 11 4
	{ 3rd	50	4,413 25	551 11 3	4,143 20	517 15 0
Total....		....	52,940 31	38,655 11 7	14,825 32	5,694 3 2

6. The rates for rice are nominally the same as those introduced into similar land in other parts of the collectorate, viz :—

<i>Class</i>	<i>Rs</i>	<i>a</i>	<i>p.</i>
1st.....	4	0	0
2nd	3	8	0
3rd	3	0	0
4th	2	8	0

But on reference to the statements accompanying it will be seen that they range higher than in Kheir, where the average was Rs. 1-10 on the acre. Rs. 4-1 is the highest I observed for any one village, viz. Gonowrec Rs. 3-5-4, the same for a class, viz. 3rd class of Moolsee petta, the general average as stated by Captain Francis being Rs. 2-8-11.

7. The diagrams which accompany the report are very beautifully executed; they give a complete representation of the cultivation and revenue since the survey under Mr Pringle. The very small amount of remission therein shown together with the steadiness with which the rice cultivation has kept on the same level are worthy of remark.

8. The future financial effects of the new assessment will in all probability realise Captain Francis' anticipations. It is fair to expect that the whole of the available rice land will be brought under cultivation, and that within the period of thirty years, during which the new rates should be guaranteed, there will be an increase of rice cultivation which, though not immediately beneficial to Government, will be profitable to the cultivators.

9. The indebtedness of the ryots in the villages along the high-road has more than once been brought to my notice, and though the fact is admitted, I should never have imagined that the lightness of the land-tax could have anything to do with it. In another part of his report Captain Francis mentions the advantages arising from the proximity of the road as affecting the classification of villages, and I think he is right. In the face of this I cannot see how the facilities for disposing of the products of cultivation afforded by the road can be the cause of the ryots being involved with their local money-lenders.

One would have expected the very converse of this. I do not pretend to solve the question, but I believe the consumption of spirits has quite as much to do with it as the rates of assessment. With regard to the Pour Khore ryots I know that there are a regular set of dealers who visit the villages and buy up the rice for the Poona grain-factors, and it is highly probable that these ready-money transactions are more profitable to the cultivators than the usual long-credit and high-interest system of resident Marwarrees.

10. With regard to palnook on which Captain Francis has bestowed a good deal of his attention, it is a matter on which Government has to decide whether Captain Wingate's rules should be upheld or Captain Francis' amendment. Of course the concession proposed by Captain Francis would be more palatable to the privileged persons affected by it, but Government has an undoubted right to enforce Captain Wingate's rules.

11. A very neatly executed map accompanies this, which I trust may be returned for the use of this office.

12. I am not aware of there being anything else requiring comment from me. I trust that Government will afford its sanction for the introduction of the proposed rates during the present fair season.

I have the honour to be, &c.

E. C. JONES,
Collector

*Poona, Collector's Office, Camp Jooneer,
18th February 1854*

No. 1026 of 1854.

TERRITORIAL DEPARTMENT—REVENUE.

From H. W. REEVES, Esq.,

Acting Revenue Commissioner, S. D.,

To H. E. GOLDSMID, Esq.,

Acting Chief Secretary to Government.

SIR,—I have the honour to forward a letter dated the 18th ultimo (No. 298) from the Collector of Poona, accompanied by a report of the 31st January last (No. 33) with enclosures from Captain Francis, the Superintendent of the Revenue Survey, on the new rates of assessment proposed for the Mawul talooka of that collectorate. The enclosures alluded to consist of eight figured statements, as also of a neatly executed map of Mawul (which the Collector requests may be returned for the use of his office), and three diagrams illustrative of the cultivation assessment and collections for the past twenty-three years.

2. The 2nd and 3rd paragraphs of the Superintendent's report describe the boundaries and physical character of the Mawul district, and call for no particular comment.

3. The chief jerayet products of the talooka are said (paragraph 5) to be natchnee, sawee, teel, wheat, and gram, bajree and jowaree being grown but to a small extent in a few villages.

4. *Rice*, however, is represented to be its chief product, and that from which the Government demands are paid. Excepting small quantities sent to the Concan and retailed on the Bombay road, which traverses the district, the whole of each season's produce is poured into the Poona markets.

5. The cultivators, generally in the mamlutdar's division of the talooka, are said to be in very impoverished circumstances, the result not of any oppressiveness of the assessment, but of their usurious

transactions with the village Marwarrees, of whom numbers settled along the Bombay road, and to whom the ryots invariably look for the payment of the Government demands against them. In the Moolsee petta however, where village Bunyas are not so numerously found, and where even the rates of assessment have been higher than in the mamlutdar's division, the cultivators are represented as being in a state of "comparative prosperity and well-being," and in a position to pay their rent *from the produce of their fields*.

6. The observations of Captain Francis in this part of his subject strike me, and I find that the Collector of Poona regards them as singular. All the Dang villages of Kownai which are situated on the Bombay road contrast favourably with those at a distance from it. There are Marwarrees it is true everywhere in these villages, but I have had it repeatedly declared to me by the ryots, while loudly exclaiming against the severity of their creditors, that they generally disposed of their produce at the proper market price and paid their debts in cash. No one need be surprised at finding a large number of Marwarrees on the Bombay road between Poona and Khandalla—trade of course attracts them there; but I cannot assent to Captain Francis' proposal to take the circumstance of the extensive thralldom in which these usurers contrive to hold the ryots as an evidence of light assessment. Past experience proves that there is no more prolific source of the usurer's power than heavy, unequal assessment. Captain Francis appears to be correct in considering the rates of the mamlutdar's division of Mawul to have been hitherto moderate. It is evident that the ryots have easy access to the best possible markets, and Mr. Jones states that a regular set of dealers visit the villages and buy up the rice, paying ready money. If therefore the Marwarrees still hold many of the ryots in debt, it is clear, as Captain Francis says, that the land offers good security; but it is equally so that the ryot has a fair command of money, and his circumstances ought not to contrast so unfavourably with those of the inhabitants of the Mawul.

7. The revenue appears hitherto to have been paid with facility, and Captain Francis proposes to make very little alteration in the assessment, as I think in the exercise of a sound discretion. I would

therefore regard the condition of the ryots of this division of Mawul as compared with that of those of Moolsee petta as an evidence of the exceeding difficulty with which Government has to contend in dealing with the cultivating class. The ryots are *generally* involved in debt, the fruit of past years of mismanagement; the rates are now everywhere much reduced and equalised, but a light assessment will not immediately resuscitate lost capital. It takes the impoverished ryot many years of hard struggle to contend against the monster evil which prevents him from becoming a free man and accumulating stock.

8. The extent and degree of accuracy of the measurement of the greater portion of the talooka were given in the
 Paragraph 8. Superintendent's progress report for 1851-52, replied to in the Government resolution of 24th August 1853, No. 4989, and as the measuring operations in the remaining villages were not completed till the present season, the Superintendent has reserved all details connected with them for his report for the year. I think, however, the information should have found place in the present papers for completeness sake.

9. In classification the plan adopted by Mr. Tytler in the Kownai dangs of the Nassick sub-collectorate is said to
 Paragraph 10. have been followed with some modification in regard to the *rice* lands, and on these the Superintendent has introduced a valuation, regulated *according to the description of rice* they are capable of producing—a system which is shown to be in accordance with the opinions and recommendations of the late Revenue Survey Commissioner, from whose report on the “Kharapats of Colaba” a quotation is given in paragraph 10.

10. The average error in the classification is said to have been in the case of rice-land 9 pies, and in that of jerayet 6 pies.

11. Being desirous of ascertaining how the “kalee” and “mal” lands of the district had been classed and rated, I addressed a letter on the 6th instant (No. 769) to the Collector of Poona for the necessary information. A copy of the reference, with Mr. Jones' reply (No. 423

of 18th March 1854) and its enclosure from the Superintendent is annexed for the perusal of Government.

12. Owing to the difference in the quantity of rain which falls in different parts of the district, the Superintendent has found it expedient to range the villages with reference to their jerayet lands and their proximity to the ghauts into 4 groups as follows:—

The first group consists of those “on the extreme eastern border touching on the part of the Kheir talooka, in which rates of Rs. 1-8 were introduced last year, and on the Hawailee talooka, assessed at Rs. 1-6.”

The second group consists of those “lying immediately west of the foregoing.” These have no bajree or jowaree cultivation, which does exist to a small extent in the 1st class villages.

The third group consists of those west of the second group, “where cultivation is generally non-continuous.”

And the fourth group of those “lying along the crest of the ghauts and the sides of hills where cultivation is non-continuous throughout.”

13. In the first of the above group the jerayet rates are fixed at Rs. 1-8, for the second at Rs. 1-6, for the third at Rs. 1-4, and for the fourth at Rs. 1; and as these rates have been determined by the Superintendent with every confidence in their suitability, and are said to have “given general satisfaction” to the ryots, I have nothing to urge against their adoption.

14. The average annual revenue derived from jerayet lands in the talooka* for the past twenty-three years (1830-31 to 1852-53) is found from the accompanying statements to be Rs. 15,364, and taking the cultivation of the year 1852-53, the old rates give a revenue of Rs. 22,053, whilst

* Omitting the villages of “Nigree” and “Nasawee,” for the reason given in the Superintendent’s 23rd paragraph.

the new rates yield for the same jerayet area Rs. 17,165, giving a reduction in the former assessment of about Rs. 22-2-7 per cent.

15. The revised survey now reported for the information of Government gives the total jerayet lands of the talooka at 76,806 acres, assessed at Rs. 31,331, or about six annas and six pies per acre.

16. For rice-lands the Superintendent proposes four classes of rates, viz. Rs. 4-8, Rs. 4, Rs. 3-8, and Rs. 3. The highest of these rates he applies to the villages of the Moolsee petta, falling into the 1st and 2nd classes of *jerayet* lands, where the best rice grounds of the district are situate. The rates of Rs. 4 and Rs. 3-8 he fixes for those petta villages which rank in the 3rd and 4th of the *jerayet* classes, as also for those of the 1st, 2nd, and 3rd *jerayet* classes in the mamlutdar's division, and the Rs. 3 rates he proposes for all the villages of the latter division which have the least production of all the lands of the talooka. To these rates, under all the circumstances stated by Captain Francis, I see no reason to object.

17. The annual average of the past twenty three years' revenue from rice cultivation in the whole talooka (excepting the two villages named in the margin of my 14th paragraph) is shown by the accompanying statements to have been Rs. 32,954. The revenue from the cultivation of 1852-53 according to the rates hitherto in force was Rs. 36,394, but according to those now proposed for sanction it would have been Rs. 35,723 or less by about Rs. 1-13-6 per cent.

18. The total area of the rice-lands will be found from the same documents to be 15,302 acres, on which the revised assessment is fixed at Rs. 39,233, giving a rate of about Rs. 2½ per acre.

19. Taking both *jerayet* and rice lands together, according to the new survey, we have 92,108 arable acres assessed at Rs. 70,564 (giving about 12 annas and 3 pies per acre), and taking the estimated revenue from kooruns, grazing lands, and dulleran cultivation at Rs. 5,292, the total revenue of the district from these sources amounts to Rs. 75,856, as shown in the following abstract:—

DIVISIONS.	No of Villages	Class.	Details of the New Assessment.						Estimated Revenue from Kooruns, Grazing Lands, and Dulleran Cultivation.	Grand Total.
			Jerayet.		Rice.		Total.			
			Acres.	Assessment.	Acres.	Assessment.	Acres.	Assessment.		
				Rs.		Rs.		Rs.		
Mamlutdar's	9	1st.	11,151	4,658	1,134	2,176	12,285	6,834	325	7,159
	51	2nd.	27,298	14,000	4,163	9,232	31,461	24,231	1,312	25,543
	24	3rd.	9,824	3,757	2,187	5,342	12,011	9,099	720	9,819
	16	4th.	5,959	12,40	1,178	2,012	7,137	4,132	760	4,898
			54,232	24,634	8,662	19,662	62,894	44,296	3,123	47,419
Moolsee petta	4	1st.	3,946	1,848	755	2,130	4,701	3,978	268	4,246
	13	2nd.	4,286	1,735	1,695	4,687	5,981	6,422	335	6,757
	20	3rd.	3,506	1,187	2,638	8,804	6,144	9,901	667	10,658
	32	4th.	10,836	1,927	1,552	3,950	12,388	5,877	899	6,776
			22,574	6,697	6,640	19,571	20,214	26,268	2,169	28,437
		54,232	24,634	8,662	19,662	62,894	44,296	3,123	47,419	
Total....	....	....	76,806	31,331	15,302	39,233	92,108	70,564	5,292	75,856

20. In his 26th to 31st paragraphs the Superintendent discusses the "palnook tenure," "which is in effect a reduced rate of assessment for lands cultivated by Brahmins and other influential classes" in the Moolsee petta. An extract is given (paragraph 26) from Mr. Pringle's report of 6th September 1830, explanatory of the nature of the system and the settlements proposed by that officer in respect to it, and in paragraph 29 the late Revenue Survey Commissioner's suggestions for disposing of the question are recited. I beg to express my concurrence in Captain Francis' proposal (paragraph 30), embodying certain modifications of the Survey Commissioner's rules for regulating pandurpesha tenures with reference to the "palnook" abatements. The most lenient course appears to me the most preferable in the case of the long-enjoyed privilege alluded to.

21. In conclusion I venture to recommend that the new rates of assessment now reported may be guaranteed to the ryots for the usual period of thirty years.

I have the honour to be, &c.

H. W. REEVES,
Acting Revenue Commissioner, S. D.

Nassick Districts, Camp Khaidgaum,
28th March 1854.

No. 1417 of 1854.

From E. C. JONES, Esq.,
Collector of Poona,

To H. W. REEVES, Esq.,
Acting Revenue Commissioner, S. D.

SIR,—I beg to hand up a letter from Captain Francis* showing how he has found it necessary in a few instances to depart from the scale proposed by him in his general report on the new rates to be introduced into the Mawul district.

* No. 244 of 10th instant.

2. The villages in which the alterations have been made are in a transition state between the regular Mawul and the Desh, the climate being generally too wet for the permanent culture of the grains grown in the open country, and yet not sure enough of rain to render the cultivation of rice to any extent safe.

3. There appears to me to be reason enough for altering the classification when it is found to have increased the rental of the villages in question, and I trust you will approve of this having been done at once, instead of giving a precedent for questioning and opening up the decision of the survey by introducing the originally proposed rates this year, and altering them in the very next season.

4. I am hardly prepared to give an opinion on the subject of the plough-tax proposed by Captain Francis to be levied from cultivators of the "bin akarce" land, *i. e.* that on which no assessment has been fixed owing to its position on the hills and slopes and its being unfit for continuous cultivation. In some places these lands though difficult of access are on a perfect level for miles in extent, and are generally more useful for pasture than agriculture. I see no objection, however, to the adoption of the plan suggested of assessing each plough at Rs. 1½ as an experiment for a few years.

5. I quite agree with Captain Francis as to the difficulties in the way of obtaining correct returns as to the extent cultivated, and believe the plan suggested by him to be the best that is to be had under the circumstances for securing a fair amount of Government rent, avoiding the labour and uncertainty of annual measurement.

I have the honour to be, &c.

E. C. JONES,
Collector.

Poona, Collector's Office,
18th January 1854.

No. 246 OF 1854.

From Captain J. FRANCIS,

Superintendent of Poona and Tanna Revenue Survey,

To E. C. JONES, Esq.,

Collector of Poona.

SIR,—You are aware that on the authority of a demi-official letter from the Acting Chief Secretary, I have introduced the revised settlement throughout the Mawul talooka according to the rates proposed in my report No. 33, dated the 31st January 1854. I have also informed you that I considered it was desirable to make a slight reduction in the jerayet rates proposed for a few of the villages on the eastern border of the district. I now beg to explain the modification of my original proposals which I consider necessary.

2. In the 11th paragraph of the report I have proposed 4 classes of jerayet rates, the highest (Rs. 1-8) to be applied to the villages on the eastern border of the district adjoining part of the Khcir and Poona Hawailé talookas, for both of which similar rates have been

sanctioned. I was led to suppose the villages of Mawul allotted to this class would bear the same assessment, but at the introduction of the settlement I found the ryots complained of the assessment imposed on their jerayet lands, it being in many cases an increase on their former payments. You will observe that I have attached some little importance (paragraph 11) to the circumstance that in villages of this class bajree and jowaree are cultivated to a small extent. It appears, however, on inquiry from the ryots that both these grains are an uncertain crop and often suffer from too much rain. The advantage therefore in this respect which I had supposed this group of villages to possess over the other part of the district does not appear to be sufficiently marked to call for an increased rate on that account. I beg therefore to propose that all the villages included in the 1st class under a rate of Rs. 1-8 be assessed at Rs. 1-6 instead.

3. This change of rates will effect the following reductions in the kumal of these villages :—

Mamlutdar's division, 9 villages	.....	388
Mahalkurry's do. 4 do.	.....	154
		<hr/>
		542
		<hr/>

The above is at the rate of about $8\frac{1}{2}$ per cent. on the sum originally proposed for these *villages alone*, but not quite one per cent. on the full kumal of the district, viz. 70,564 (*see* paragraph 24). The modification is therefore of little importance viewed with reference to the whole district, but it will have a sensible effect in the case of the few villages to which the change of rates is applied.

4. As soon as I had satisfied myself from inquiry that it would be desirable to introduce the change in the original proposals, I ordered the rates of the villages of which the settlement had not then been made to be calculated accordingly. With the exception therefore of three or four villages, the settlement has been made according to the modification now submitted for sanction, and in the case of these exceptions I have since made the necessary alteration in the rates and explained the same to the cultivators. I thought, perhaps, at

